THE IRON TRADE REVIEW

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Great Volume of Specifications

Comes to Mills and Tonnage of Orders on Hand Increases Rapidly— Prices on Some Products Advancing

THE volume of orders for finished iron and steel products has been greatly increased during the past few days and the second half of the year is entered with highly encouraging prospects. The most satisfactory feature of the improvement is that it is due largely to increased demand for domestic consumption, although the buying for exporting is still very heavy. At the close of the first half of the year, the requests of many consumers to be allowed to specify in excess of contracts expiring July 1 were not granted by manufacturers on account of the rapid filling up of order books. In the case of one large independent company, which had been promising deliveries on certain products within three weeks, deliveries cannot now be given in less than three months. One of the largest companies of the Steel Corporation had the heaviest business in bars in June of any month except one in the history of the company.

Steel Bars

Negotiations for tremendous quantities of steel bars for the manufacture of shrapnel are pending. Action is soon expected on from 70,000 to 80,000 tons of rounds pending in the east. The shafting market has suddenly shown decided improvement, due in part to the demand for this material for use in manufacturing a part of the shrapnel shells. On steel bars larger than 2 inches in diameter, many mills will not promise delivery in less than two to three months. Automobile manufacturers are buying freely.

Iron Ore

The Lake Superior iron ore market is showing indications of improvement, as orders are being received from some important consumers to ship on long-time contracts in larger quantities than planned at the beginning of the season. An additional sale of 20,000 tons of local eastern ores has been made to an eastern Pennsylvania company. It is believed that New Jersey and New York ore companies have about reached the limit of their capacity, and with foreign shipments greatly curtailed, it may be necessary for eastern consumers to buy more largely from Lake Superior sellers.

Plates

The receipt of very large numbers of orders for plates and the insistent demand for deliveries have added strength to the plate market and the irregularity in prices which has been prominent, particularly in the Chicago district, is disappearing. The sheet market continues to show some irregularities on black and blue annealed. Galvanized sheets are somewhat easier.

Wire Products

It is estimated that recent contracts for barbed wire for export have amounted to about 75,000 tons. The prevailing price is understood to have been $2.40 a hundred pounds. The price of galvanized barbed wire has been advanced to $2.50 and some other advances on galvanized wire products have been announced.

Pig Iron Production

Pig iron production by coke and anthracite furnaces for June amounted to 2,369,932 tons, a gain of 114,775 tons compared with May. The stacks in blast show a net gain of 14, making 221 in operation, the largest number since March, 1914, while the production was the largest since October, 1913. The merchant furnaces made a gain of 41,290 tons, the largest gain in many months, but the principal increase in production was still with the steel companies, it being 69,403 tons.

Railroad Buying

Railroad buying is fairly active. It is understood that 2,000 cars originally awarded to a Canadian company have been placed with the American Car & Foundry Co. The Baltimore & Ohio has purchased about 20,000 kegs of spikes. An inquiry for from 50,000 to 60,000 kegs of spikes for Russia is pending. In rail orders, June made the best record of any month this year.

THE OPEN HEARTH

Right of Americans to Sell Munitions to Belligerents

NEARLY a year has passed since the European war started and the legal right of manufacturers of the United States to sell to any of the belligerents has been clearly established in the minds of nearly everybody, except the most ardent sympathizers with Germany. Even Ex-secretary Bryan admits refusal of the United States to sell to the allies would be a violation of neutrality. But the question as to the moral right of manufacturers to sell to the belligerent is still a burning one and is viewed in various ways by different people. It is pretty generally agreed that there is no moral wrong in selling foodstuffs to the nations at war, and many manufacturers have no qualms of conscience about selling ordinary supplies for export to the armies. For example, a manufacturer who has a contract for furnishing five hundred thousand brushes to ship to the armies said to the writer a few days ago, "If we can sell anything that will help the soldiers by making them more comfortable, we shall do so, but we positively refuse to make anything to help kill people."

Herman Ridder, the able and patriotic editor of the Staats Zeitung, New York, in an editorial published Monday of this week, says that the movement for the prohibition of the exportation of arms and ammunition from this country to the belligerents is based on sanity. Then Mr. Ritter adds: "When a man crazed to murder allies himself with the thought which underlies the movement, its leaders do not stand responsible for his acts. The assassin acted solely from his own disordered mind." These statements are absolutely true. We would not for an instant think of questioning the sincerity or the sanity of such men as Mr. Ridder, who, if this country should become involved in war, would rally to the support of the stars and stripes as quickly and enthusiastically as any other citizens. American citizens who, on account of having been born in Germany, or for other reasons, honestly believe that the exportation of munitions should be stopped are entitled to their opinion and to take reasonable means to persuade others to agree with them. They may even go to the extent, as some are doing, of petitioning the President to call a special session of congress to stop these exports. It is possible, although these citizens do not so intend it, that the agitation may inflame weak minds and cause them to commit acts of violence. Whether this is true or not, it is the duty of men who believe that manufacturers have not only the legal, but the moral right to export munitions to state their views calmly, but vigorously.

As to whether it is right to sell shrapnel and other munitions, there is a chance for a good argument on either side. The Iron Trade Review has maintained the affirmative and the following article by Daniel Wells, of the Detroit Seamless Steel Tubes Co., takes the same position, discussing the subject in a very unique, but thoroughly sensible and convincing manner.

IT HAS been said: "If the heart of the American manufacturer, filling war orders, were exposed to view, it would be found round and flat with the dollar mark on one side." It has been claimed we were a nation of pious peace preachers till Europe's purchasing agent ascended his swivel chair and asked for bids on terms cash and inspection liberal. Then began this Klondike rush for foreign gold. Let's consider this question a moment.

Are we war suppliers as bad as they paint us? War is tough the best you can make it. The tougher you make it the quicker it is over. If it is a real war, assume it will last a year. If it is made but half a war, it will last two years; if a third of a war, three years, and so on.

Just push the picture of a humanitarian war out of the back of your head; there is no such thing. The more knives you supply the butcher, the quicker the victim is out of his misery.

This country at present seems a vast hardware store. The only neutral stand we can take is to sell every one who comes to our counter.

Pretend there is a row going on outside of town somewhere and it so happens only one of the fighters can get to our store. We will be favoring the other fellow if we refuse to sell to him.

It may be ethically wrong to supply any person or nation at war with any product. If this be so, we must in some distant day of peace, meet and agree upon the point, but now—no. We can't change the rules while the game is in progress. There is no game on earth that allows this. War, because it happens to be a taker of life, is not to be governed by rules or theory that have proved impracticable everywhere else.

It has been said of us that at first we decried the war, but that "Swift as light we have changed from

THE OPEN HEARTH

the holier than thou attitude to—Can we get the business?" It is something to our credit to reflect that our many factories now turning out war supplies have never been used for that purpose by ourselves. In other words, we have ample peace facilities, but it has never been our view of national life to turn them to military use.

When a hardware merchant sells revolvers, he doesn't stand and ask every purchaser the intended use of the weapon and ticket him accordingly. He is there to do a general store business, to sell to all comers and not to ask questions that are none of his business. If it is the ethics of the trade to sell only to those whose intentions are humane, then the law should have been so framed at the start when he secured his charter.

Today Europe is before our hardware counter. He is asking our prices on a large assortment of knives, pistols and brass knuckles. It looks a little suspicious, but he has always been a responsible party in good standing. We cannot assume that he is a criminal and refuse to sell him. He has a reputation as good as ours. In fact, he has a hardware store at home which for these specialties is larger than ours, but his stock is a little run down just now. It is not for us to lean over the counter, shake our finger in his face and say, "Now first tell us where you are going with these goods." That would be just playing store. What he is going to do with these weapons is *his* business. There may be burglars in his house that he wants to drive out. He has not asked any advice of us, he is merely before us a customer.

It seems there was another party from Europe, a German, unable for reasons best known to himself to get up to our counter. He also would like to buy if opportunity offered, but at any rate he is not there; so we are not selling him. We naturally regret this, as we like to treat all comers alike, especially if it means added profit to us, for we must admit that we are strictly a race of manufacturers and merchants.

It is no concern of ours that this other party has been unable to reach our counter; that is an affair of his own. We have heard through friends he is accusing us of partiality; we are sorry for that. He apparently does not stop to think we are in the hardware business to broaden our trade as much as possible and that we would gladly welcome a new face at our show window, no matter who it is. *Das macht nichts aus.*

We have heard in a roundabout way that our good European customer buys these knives to stick into this other party, who becomes furious each time he learns where they came from. He accuses our customer of the sin of not having a large enough supply of his own of these inventions of the devil and having to seek outside source.

I say we have heard this in a general sort of a way, not being able to hold an inquiry over each shipment as to what vessel it took or what destination it reached or was to reach before it was destroyed, which seems to happen now and then.

The upshot of the whole thing is this: We will quite likely continue in the hardware business long after this world affair has blown over. We will have extended our trade considerably, as our new customer will be loyal to the dealer who supplied him in his need. The ethical code of the international hardware supply business will be so rewritten that there will be no mistake in the future as to whom we can sell. Last and best of all,—do we dare say it?—perhaps pistols and brass knuckles will practically disappear from the hardware shelves of the world, their place being taken by a much larger stock of farm tools and carpenter supplies.

Will Not Give Advice

THE federal trade commission has issued rules to govern practice in cases brought to its attention. These rules indicate that proceedings cannot be instituted solely by a disgruntled competitor, for the commission has decided that while any person, partnership, corporation or association may file a request for proceedings to be instituted, the commission will itself investigate the matters complained of, and if it finds that there is apparent violation of law, it will issue a notice of formal complaint, giving the charges and notice of date of hearing, which must be within 40 days after the serving of such formal complaint. The defendant is given 30 days to reply and the subsequent proceedings are much like those in a court.

Perhaps the most interesting feature of these rules is what they do not provide. It is especially noteworthy that there is no reference to any plan by which inquiries may be made by business men respecting contracts, agreements or combinations, nor is there any reference to the commission's powers or actions on this subject. This would seem to indicate that the commission does not intend to follow the policy urged upon it by certain lawyers, as indicated in an editorial published in these columns June 24, to go further than it has any right to go in extending advice to business men as to the legality of their business methods. The rules indicate that the commission will be a court of investigation, but not a tribunal to dispense advice.

Prices Present and Past

Quotations on leading products July 7, average for June, 1915, average for April, 1915, and average for July, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices July. 7, 1915.	Average for June, 1915.	Average for April, 1915.	Average for July, 1914.
Bessemer pig iron, Pittsburgh..	$14.70	$14.58	$14.55	$14.90
Basic pig iron, Pittsburgh.....	13.70	13.54	13.45	13.90
No. 2 Fdy. pig iron, Pittsburgh	13.70	13.45	13.45	13.90
Northern No. 2 Fdy., Chgo....	13.00	13.00	13.00	14.00
Lake Superior Charcoal, Chgo..	15.75	15.25	15.75	15.75
Malleable, Bessemer, Chgo.....	13.00	13.00	13.00	14.00
Southern No. 2, Birmingham...	9.50	9.50	9.50	10.00
Southern Ohio No. 2, Ironton.	12.50	12.50	12.75	13.00
Basic, eastern Pa.....	13.75	13.75	13.25	14.00
No. 2X Virginia furnace.....	12.50	12.50	12.50	12.50
No. 2X foundry, Philadelphia..	14.25	14.25	14.25	14.75
Ferro mang., Balt., (prompt)..	105.00	105.00	78.00	37.50
Bessemer billets, Pbgh.....	20.50	19.87	19.50	19.30
Open, sheet bars, Pbgh.....	21.50	20.37	19.60	20.20
Steel bars, Chicago.....	1.39	1.39	1.39	1.28
Steel bars, Pittsburgh.....	1.25	1.20	1.20	1.11
Iron bars, Philadelphia.....	1.17	1.17	1.17	1.17
Iron bars, Cleveland, local del'y.	1.20	1.20	1.15	1.20
Iron bars, Chgo. mill.....	1.20	1.15	1.15	1.05

	Prices July. 7, 1915.	Average for June, 1915.	Average for April, 1915.	Average for July, 1914.
Beams, Chicago	$ 1.39	$ 1.39	$ 1.36	$ 1.28
Beams, Pittsburgh	1.20	1.20	1.15	1.11
Beams, Philadelphia	1.359	1.359	1.309	1.25
Tank plates, Pittsburgh.....	1.20	1.15	1.11	1.11
Tank plates, Chicago.....	1.39	1.31	1.28	1.28
Tank plates, Philadelphia.....	1.359	1.359	1.309	1.25
Sheets, blk., No. 28, Pittsburgh	1.80	1.80	1.80	1.80
Sheets, blue an., No. 10, Pbgh.	1.35	1.35	1.30	1.35
Sheets, galv., No. 28, Pbgh....	4.50	4.46	3.30	2.75
Wire nails, Pittsburgh.....	1.55	1.55	1.59	1.51
Connellsville fur. coke contr...	1.65	1.65	1.65	1.85
Connellsville fdy. coke, contr...	2.25	2.25	2.25	2.29
Heavy melting steel, Pbgh....	11.75	11.75	11.90	11.55
Heavy melting steel, east'n Pa.	12.00	11.25	11.25	10.50
Heavy melting steel, Chgo.....	9.50	9.37	9.30	9.50
No. 1 wrought eastern Pa.....	13.00	12.50	12.50	12.00
No. 1 wrought, Chgo.....	9.00	8.75	8.55	9.00
Rerolling rails, Chgo.....	10.00	10.00	9.85	11.25
Car wheels, Chgo.....	10.00	9.87	9.80	11.00

(For Additional Prices See Page 108.)

Pig Iron Prices Generally Firmer

Some Transactions in Steel Making Grades at Pittsburgh—Increased Activity in New York—South is Hopeful

Pittsburgh, July 6. — Bessemer and basic pig iron advanced in price in June, according to monthly average sales figures compiled by W. P. Snyder & Co., based on sales involving 1,000 tons or more by valley furnaces. Bessemer iron in June established an average of $13.75, or 10 cents a ton above the average recorded in May, and basic iron established an average of $12,724, or 7 cents a ton above the average recorded in May. Averages recorded last month represent the price at which both grades are being held. The Marshall Foundry Co., which last week bought 5,000 tons of bessemer, is negotiating for a similar tonnage for last half shipment. Follansbee Bros. are understood to have closed for 5,000 tons of last half basic at about the current market price. The Colonial Steel Co. is still in the market for 10,000 tons of basic for last half delivery. Leading sellers of foundry iron are asking $12.75, valley, and above for No. 2 foundry and malleable. The Pennsylvania railroad is negotiating for 1,000 tons of high manganese and low silicon iron for shipment to its foundry at Altoona, Pa. While pig iron grades have not yet responded to the improvement reflected by the market for finished products, yet dealers are confident heavier demand and more remunerative prices soon will be enjoyed.

More Activity at New York

New York, July 6.—Four or five new buyers have come into the market for good-sized lots of iron during the past few days and these, with the usual scattering trade, have again produced a moderate activity in this district with pending inquiries totaling probably 15,000 to 20,000 tons. In addition, several of the larger eastern buyers, including the Eastern Malleable Iron Co., or malleable syndicate, have been sounding the market, but apparently have not been able to induce the furnaces to accept their idea of price for forward delivery. Some manufacturers of machine tools and other consumers who have profited from war business now are figuring on metal in more liberal quantities than they usually require. One of these matters involves 4,000 to 5,000 tons of foundry for a Massachusetts machinery plant. Another for an East Orange, N. J., buyer calls for 1,000 to 1,500 tons of foundry. Another consumer is figuring quietly on a block of 5,000 tons of foundry iron and may buy more on final action. An Elizabeth buyer asks 2,000 tons of high silicon iron and a Newark shop has closed for 600 tons of eastern Pennsylvania foundry. All of this iron is wanted for last half. Prices are little changed from recent ranges and at tidewater $14.25 to $14.50 for No. 2X still is being made. There have been cases, however, within the week, where eastern Pennsylvania makers have been refusing considerably higher offers. In Buffalo iron, several thousand tons for last half were sold in the week in eastern territory, but not in this immediate district, at $13, furnace. It is not thought, however, that the $12.50 price at Buffalo, which was active a week or so ago, has yet disappeared. Another sale of about 1,000 tons of standard bessemer to come from the Pittsburgh district has been made to Italy. Better prices by a considerable margin than recent similar sales were obtained in this instance.

Melt Improving

Cleveland, July 6. — The melt of foundries in the Cleveland district is increasing slowly and the outlook is that buying will be on a larger scale at a not far distant date. At present the buying for delivery in the immediate Cleveland district is not large, but agencies having furnaces in

(*For complete prices see page* 108.)

other districts report business very fair.

Special Iron Sells

Cincinnati, July 6.—Demand for low phosphorus iron in small lots has caused an advance in price of about $1.50 a ton during the past 10 days. Foundry iron is selling only in scattered lots, and its price is stationary at from $9.50 to $10, Birmingham basis, for southern No. 2 foundry, and from $12.50 to $12.75, Ironton basis, for southern Ohio No. 2 foundry, both for last half delivery. Recent sales have been chiefly of special grades. A Michigan manufacturer has taken 1,000 tons of coke malleable iron, and a northern Ohio melter has purchased 1,000 tons of charcoal iron. Another Michigan melter has contracted for 500 tons of charcoal grades. Inquiries before the market include 500 tons of southern iron from Louisville, Ky., and 500 tons divided between northern and southern grades from a local concern. An Indiana melter is out for 800 tons of analysis iron for the first half of next year, but furnaces will not quote that far ahead. Shipments on old contracts continue very good, and are a bright feature in the market.

Pig Iron Drifting

Chicago, July 7.—Melters of malleable pig iron in the Chicago district continue to inquire for material to a greater degree than users of foundry iron. Large inquiries current a short time ago have been filled or withdrawn and have been replaced by more numerous inquiries for smaller tonnages.

July being the period of inventory and repairs when many plants are shut down, this habit tends to make this month dull each year. The trade in general is not showing slowness and the rate of melt established in June promises to be kept up in all plants which continue to operate steadily.

Inquiries are beginning to come to pig iron sellers as to price on delivery during the first half of next year. Following the course pursued last year, sellers are not quoting and books probably will not be opened for several weeks. Last year inquiries began in July, but no iron for this year was sold until the middle of October. Conditions this year make this course more than ever wise and prices beyond Jan. 1 probably will not be named for some time.

Northern makers find no difficulty in obtaining $13, Chicago furnace, for their output and most southern dealers are asking $10, Birmingham, but trading in southern iron is so slight that a fair test of price is not possible in this district.

Conditions Improving

Philadelphia, July 6.—Not many sales of important tonnage have been put through in the pig iron market in this district the past week, but there has continued a good run of small new business and a well-sustained movement of shipments from the furnaces which reflect a more satisfactory condition of trade generally among melters. Whatever betterment of volume now is shown by the market, it remains apparent that this has not been sufficient to raise the values, especially in the more widely used grades, such as foundry, in which $14.25 to $14.50, Philadelphia, for No. 2X still is being done. Some of the lowest sellers have raised their schedules and other makers have advanced beyond the average level, but the uncertainty over prices in the Buffalo district keeps some eastern Pennsylvania producers from adopting stronger policies. Steel-making grades, including basic and low phosphorus, hold their recent advances. An additional sale of 1,500 tons of basic has been closed at about the market, which is considered around $13.75, delivered. The seller of a recent tonnage to Lebanon, Pa., remains in some doubt, as none of the regular merchant makers of basic will furnish this iron. It is believed an eastern Pennsylvania steel company, which, it is known, bid upon the order, took the lot. Makers of standard low phosphorus now are sold up for the remainder of the year, but have a considerable stock. Lebanon makers sold 1,500 tons additional in the week. The Pennsylvania railroad is inquiring for 1,500 tons of assorted grades for third quarter delivery at Altoona.

More Activity in South

Birmingham, Ala., July 6.—There is a better tone to the iron market with the $10 quotation on No. 2 foundry tending to strengthen, but the feature of the local iron industry the past week has been the official announcement of three additional furnaces going into blast and unofficial information that the blowing in of a fourth one is contemplated within the next week or two.

About 10,000 tons have been sold, it appears, during the week, 5,000 of which was No. 3 foundry at $9.50, which goes to a northern manufacturer. Another bid for good tonnage of No. 2 foundry at only 12½ cents under the $10 quotations is known to have been refused.

Estimate of total sales for June is placed at 100,000 tons. The estimate is rather difficult of computation, however, for it appears that one concern for some reason received about half of this amount while other operators state they have done very little business throughout the month. Stocks are lower in the Birmingham district than in considerable time, and this, together with anticipation of certain new business, is generally considered as the cause of furnace activity rather than any particular activity in the iron market itself. One furnace at Ensley and another in Birmingham are to be blown in by the Tennessee Coal, Iron & Railroad Co. within a few days, according to official announcement, and the Vanderbilt furnace of the Woodward Iron Co. is to be blown in by July 15, it is stated. No official announcement comes from the Sloss-Sheffield company, but it is known that that company contemplates blowing in one of the North Birmingham furnaces within a week or two.

(*For complete prices see page* 108.)

Rolls Large Plate

What is believed to be the heaviest rolled steel plate ever manufactured in this country has been produced by the Worth Bros. Co., Coatesville, Pa., for the new battleship California now being built at the Brooklyn navy yard. The Worth Bros. Co. has the contract for furnishing the steel plates for this dreadnaught. The large plate in question is one of the eight turret gun girder plates. It was rolled from an ingot weighing 33,000 pounds, which had been cast especially in the open hearth department. The outside finished dimensions of the plate, after trimming, were 1-13/16 inches in thickness, 133½ inches in width and 339⅝ inches in length. While the Worth Bros. Co. in the past has rolled wider plates, or 146 to 148 inches, these have either been of less thickness or less length, and hence the ingot has been somewhat smaller.

To Guarantee Analyses

Beginning Aug. 1, the Barnum-Richardson Co., Lime Rock, Conn., will guarantee all analyses of the Salisbury charcoal iron which it sells. The company is equipping a laboratory for this purpose.

The R. K. Leblond Machine Tool Co., Cincinnati, has purchased 27 acres in Hyde Park at an expenditure of $100,000. The rumor that a new plant is to be built on this site has been denied by the company.

Bar Business is Active

Specifying in Excess of Contracts Not Allowed by Steel Companies—Shafting Improves Greatly

Cleveland, July 6.—The steel bar market is exceedingly strong. The specifying on contracts expiring July 1 was in many cases in excess of the tonnages called for by the contracts. Frequently steel companies declined to accept such excess tonnages. One large independent company in 24 hours changed its promises on certain sizes from three weeks to three months, and another large company has all the tonnage that it wishes to take for the remainder of the year.

Shafting has improved rapidly. This is due in part to the use of large quantities of steel bars in the manufacture of shrapnel, but the heavy demand for steel bars and shafting is by no means confined to war purposes. The automobile trade is calling for very large tonnages.

Still Negotiating

New York, July 6.—Negotiations for 70,000 to 80,000 tons additional of 3¼-inch rounds to be converted into shrapnel by a French works, which have been going forward in this territory, have brought no definite results as yet. Action in this matter is expected at an early date. Other tonnage of less amount is in the market. A sub-contract for shells placed with a Brooklyn maker, it is reported, will require some thousands of tons. Effect of the large orders for shell rounds which have been placed in this country continues to be shown in the position of various mills, some of which now are not so anxious for much additional tonnage for this year and then only at advanced prices. Some makers have been quoting 2c and even as high as 2.25c, mill, on small sizes of rounds. A number of export lots of bars are being placed, including some for the British Isles, India and Greece, and the prices have been approximately at the domestic level. Specifications from domestic buyers in the non-war lines have remained good. The general market situation is satisfactory to makers and there appears to be uniformity in price on ordinary soft steel bars at 1.25c, Pittsburgh, or 1.419c, New York.

Quiet But Strong

Philadelphia, July 6.—After the heavy rush of specifications against expiring second quarter contracts in this territory last week, the market situation has been rather quiet though strong. Practically all the important buyers in this district now are under cover on their third quarter needs, but there are some exceptions and these are receiving the attention of the mills. The steel bar market is holding uniformly at 1.25c, Pittsburgh, or 1.409c, Philadelphia. Higher and firmer prices for export also are appearing. A lot of 1,000 tons of bars for export was accepted by one maker at 1.20c, Pittsburgh, but this mill refused a day or two later to double the tonnage at the same figure. An eastern Pennsylvania maker has taken within two weeks 6,000 to 8,000 tons of steel rounds from an eastern manufacturer for shell purposes. Leading makers of shafting announced a further advance of $2 a ton, effective July 1, to 66 off in base territory in carloads and 61 off in less than carloads.

War Orders Predominate

Pittsburgh, July 6.—Demand for steel rounds for the manufacture of war material continues heavy and most mills are unable to promise larger sizes for anything like nearby delivery. In fact, some interests are not selling larger sizes of rounds for shipment before Oct. 1. The 1.25c price of bars has been well established. Iron bars have been advanced to 1.30c by several prominent sellers and belief is expressed that the prevailing 1.25c minimum quotation soon will disappear.

Steel Bars Strong

Chicago, July 7.—Mills are becoming more and more filled with tonnage of steel bars and even those which, from their location, were last to feel the strengthened demand have booked large tonnages. For the most part, all quotations are withdrawn and inquiries must be referred to the main sales office before figures will be given. Deliveries are being pressed further into the future and in many cases four to six weeks are necessary before material can be shipped. Export business forms the backbone of this tonnage, but railroad buying and agricultural implement necessities have contributed from the domestic field.

Makers of agricultural implements have begun earlier this year to make up their product and considerable specifications for material for delivery in August have been booked already. Hard steel bars and bolts are also being ordered much earlier than usual and these plants probably will be busy earlier in the season.

Iron Bars Slow

Chicago, July 7.—Buying of bar iron has not increased and demand is exceedingly small. Not sufficient business is being considered to give a test of prices, which remain at the former quotation, 1.20c, Chicago mill. Plants are operating somewhat better than 50 per cent, but the market is lifeless.

Hoops, Bands and Shafting

Pittsburgh, July 6.—Most makers of cold rolled shafting now are asking 66 per cent off list for future delivery and it is not improbable the market will be firmly established at that figure within the next week or 10 days. Mills are operating at practically maximum capacity. Hoops are commanding 1.30c and steel bands are named at 1.25c.

(*For complete prices see page* 108.)

Bolt Prices

Are Moved Up—Some Plants Operating at Full Capacity

Cleveland, July 6. — The recent marked improvement in bolts and nuts continues and some plants are now operating at 100 per cent of their capacity for the first time in their existence. Owing to the increase in demand and bright prospects, prices have been advanced 5 per cent on carriage bolts, machine bolts and lag or coach screws, while on hot pressed nuts discounts have been decreased 10 to 20 cents.

Tube Mills Busy

Pittsburgh, July 6.—Specifications for merchant iron and steel pipe are coming out in good volume and demand for line pipe is rather heavy. Discounts are reported to be maintained by all sellers in this district. Demand for locomotive boiler tubes is satisfactory, but merchant tubes show no snap.

Agency Terminated

Cleveland, July 6. — The Bourne-Fuller Co., Cleveland, announces that effective Aug. 1, 1915, its selling arrangement with the A. M. Byers Co., Pittsburgh, will terminate.

Numerous applications for special policemen for guarding industrial plants have been received at Harrisburg, Pa., since the outbreak of the war in Europe. Manufacturers filling contracts for war material, in many instances, have asked for protection.

Many Orders for Plates

Rush of Business at Close of First Half—Prices More Regular at Chicago

Philadelphia, July 6. — The heaviest flow of mill business yet enjoyed by any of the eastern Pennsylvania plate makers came to them last week immediately prior to the expiration of second quarter contracts July 1, in which prices were favorable to the buyers. The office of one important maker here entered in two days approximately 250 orders of good total tonnage, which established a high record for this company in the number of separate items listed. The tonnage was much in excess of full capacity and this maker this week is operating at practically 100 per cent. Other eastern plate makers have profited in a similar though not in so pronounced a fashion. The Worth Bros. Co. has received 2,000 tons of plates of stock lengths and sizes for the Panama canal. Bids are going in today on about 2,500 tons for the new government collier CUYANA. Two more merchant vessels are on the verge of being closed with eastern yards. Instances are cited where important buyers contracted with eastern makers for fourth quarter at 1.25c, Pittsburgh, or 1.409c, Philadelphia, within the week after trying for 1.20c, Pittsburgh. For early delivery, 1.20c, Pittsburgh, still is being made by some eastern mills and lower has been done recently on specially desirable business.

Plates Gain Strength

Chicago, July 7.—Steel plates, the last finished steel product to feel the strengthened condition of the market, have advanced at least $1 per ton in the past week. Plates have been much softer than other finished steel products, and 1.34c has been quoted openly within a week. Some tonnages have been disposed of at 1.28c, Chicago mill, recently, on specification where protection had been given bidders on car contracts. It is believed these protection figures are no longer in force and the lowest quotation now appears to be 1.39c, Chicago mill. Other sellers are obtaining 1.44c, Chicago, without difficulty.

Plates Not Firm at 1.25c

Pittsburgh, July 6. — The Carnegie Steel Co. and the Jones & Laughlin Steel Co. are quoting 1.25c on plates, shapes and bars, but irregularity still features the market for plates in some districts. Car builders are specifying rather heavily, but some mills appear to be in need of additional tonnages. Finishing mills in the immediate district are operating at from 75 to 90 per cent of nominal capacity.

Compelled to Operate

Cleveland, July 6.—The Cleveland Steel Co. expected to close its plant this week for inventory and repairs, but the demand for its plates and sheets was so strong that it has been compelled to continue in full operation. Prices in this district are being well maintained.

Will Need Plates

Several hundred tons of steel plates will be needed by the Cincinnati water works, which will build a battery of high pressure water tanks in Kennedy Heights with a total capacity of 16,000,000 gallons of water. Each tank will be 80 feet in diameter and 40 feet high, and will be constructed entirely of steel.

Cast Iron Pipe

For Public Uses is More in Demand in the East

New York, July 6.—Public buying of cast iron pipe in eastern territory, has taken on some appearance of greater activity the past week through the increased number of proposals offered. Most of these, however, do not run to large amounts and while the number of buyers is more extensive, the volume of the market, taken in connection with a continued fair purchasing by private users, does not change materially. Eastern Pennsylvania pipe shops now are operating at from 60 to 75 per cent of capacity. It is now reported that the 10,000 to 12,000 tons of pipe for recent large contractors' lettings at Philadelphia, will be supplied by the Bristol, Pa., maker.

New York City will take bids July 12 on 900 tons of 36 to 48-inch pipe and specials. The United States Cast Iron Pipe & Foundry Co., which, as reported, took 3,000 tons for East Orange, N. J., did so at $22.40, delivered, on one lot of 150 tons of 6 and 8's and on a second parcel of 2,750 tons, it obtained the business at $22.40, delivered. The same producer also is low at $24.10, delivered, on 420 tons of 6, 8 and 10's for Oakfield, N. Y., and on 250 tons of 6 and 8's for Southport, N. C., at $22.05, delivered. Oswego, N. Y., took bids today on 665 tons of 6, 8 and 10's as did also Syracuse, N. Y., on 340 tons of 6 and 12's and Yonkers, N. Y., on 425 tons of 10-inch; Illion, N. Y., closes July 9 on 613 tons of 10-inch; Woonsocket, R. I., July 7 on 100 tons of 6 and 12's, and Compton, Va., on July 12 for 223 tons of 6, 8 and 10's. Avalon, N. J., is in the market for 500 tons of 12 to 20's and Rittman, O., for 725 tons of 3 to 8, inclusive. A requirement of 4,000 tons for Caibarean, Cuba, for which the J. G. White Co., New York, recently took a contract, is to be satisfied early in July, as bids are asked for that time.

(*For complete prices see page* 108.)

Inquiries are Small

Chicago, July 7.—Although makers of cast iron pipe are exceedingly busy making deliveries on orders previously booked, comparatively little business is current and tonnages are not being closed for large quantities. Buyers who provided for their requirements earlier in the season are making every effort to obtain deliveries, so that work may be continued steadily.

The Massilon Iron & Steel Co. has been awarded 62 tons at Sandusky, O. The United States Cast Iron Pipe & Foundry Co. has taken an order from a contractor at Stratford, Ia., for 100 tons. Bids were to be opened July 6 at Oglesby, Ill., for 703 tons, and at Pratt, Kans., July 7 on 240 tons.

Wire Products

Are Advanced Irregularly—Larger Extras for Galvanizing

Pittsburgh, July 6.—Irregular advances for lighter gages of galvanized wire and nails, polished and galvanized staples, painted and galvanized barb wire, have been announced by wiremakers in the Greater Pittsburgh district. Wire nails still are quoted at $1.60 a keg and plain wire at $1.40, and 80 cents per 100 pounds continues to be quoted for galvanizing No. 14 gage and heavier plain wire. Makers are asking an extra of $1.15 for galvanizing Nos. 15 and 16 gage and $1.60 is the extra for Nos. 17 and 18 gage; these figures are 5 and 10 cents, respectively, above the previously prevailing extras. The extra for galvanizing nails, 1-inch and longer, now is $1.75 as against the previously prevailing extra of $1.50; $2.25 is being quoted for galvanized nails shorter than 1-inch as against the previously prevailing extra of $2. Polished staples have been advanced from $1.60 to $1.70; galvanized staples from $2.40 to $2.50; painted barb wire from $1.60 to $1.70, and galvanized barbed wire from $2.40 to $2.50 per 100 pounds. These prices are for jobbers.

Galvanized Sheets Easier

Owing to Decline in Spelter—Still Cutting on Black and Blue Annealed

Pittsburgh, July 6. — Only a few makers of galvanized sheet products are offering material on account of the continued high price of spelter. Within the last few days, some tonnage has been sold on the basis of 4.50c for No. 28 gage, and that figure now represents the minimum of the market. Black sheets appear firmer, but 1.80c continues to be shaded in adjacent territory, when desirable tonnages are involved. Specifications for sheets are coming out in good volume and new buying is active. Car builders and automobile manufacturers are playing rather prominent parts in the market.

Booking More Orders

Philadelphia, July 6.—Eastern Pennsylvania sheet manufacturers have been booking business in such a better rate lately that they now find themselves in the most satisfactory position in two years. Capacity operations are being maintained and higher prices are being secured. For early delivery, 1.40c, Pittsburgh, or 1.559c, Philadelphia, for No. 10 blue annealed is being obtained. Third quarter contracts generally have been taken at 1.35c, Pittsburgh, and there is some inquiry for fourth quarter contracts on which the mills are inclined to go slowly in quoting.

Sheets Lower

Cincinnati, July 6.—Prices on sheets are a little lower for prompt delivery, but mills are holding for good premiums on shipments beyond a month. Galvanized sheets No. 28 gage are quoted at from 4.50c to 5c, Pittsburgh basis, for immediate delivery, and black No. 28 gage are given at from 1.75c to 1.80c, Pittsburgh basis, for shipment over the third quarter. Sales are being retarded because of the refusal of mills to sell very far ahead, but are good, considering the circumstances.

Sheets are Weak

Chicago, July 7.—Makers of steel sheets find conditions absolutely unchanged in their market. Galvanized sheets are not being made or sold and black sheets continue weak with small demand.

Tin Plate Mills Still Busy

Pittsburgh, July 6.—The market for tin plate reflects further improvement, but low prices have not disappeared. A number of attractive orders for export have been booked and inquiries for shipment abroad involve heavy tonnages. Some material continues to be offered at $3.10, base.

Spelter Firmer

But Buyers Are Shy—Non-Ferrous Market Not Active

New York, July 6.—Activity has been lacking in practically all the metals during the week closing today. Dullness especially featured the copper market, which has been in quiescent state for some time. Some of the first hands continue to stick to the old asking price of 20.50c, delivered 30 days, on electrolytic. Others, however, have been making sales at considerably lower, and numerous offers have been made of late of 20c, delivered 30 days. Second sellers now are offering electrolytic in limited quantities at 19.75c to 19.87½c, cash. The best brands of casting copper are quoted at 19.75c to 20c, delivered 30 days, while ordinary casting copper is held at 18.37½c to 18.62½c, cash. The best brands of lake are quoted at 22.50c to 23c. Ordinary lake is held at 20.37½c to 20.50c, cash, by producers and arsenical lake at 20.25c to 20.37½c, cash; second sellers offer limited quantities of lake at concessions.

The lower offerings on lead by second sellers, which featured the lead market recently, have disappeared and, in fact, the stocks of these interests seem to be about wiped out. As a result, the market is stronger. The American Smelting & Refining Co. continues to ask 5.75c, New York, and 5.66½c, St. Louis. Some independent producers are asking premiums, in some cases quoting as high as 6c, New York, and 5.87½c to 5.90c, St. Louis.

The spelter market has firmed up somewhat and last week a considerable amount of business was transacted, some involving delivery as far ahead as the first quarter and first half of next year. The buyers were principally the brass mills. Some of the galvanizers were inquiring rather actively on prompt and nearby prime western, but this industry did not show much interest in futures. At present, the market is rather quiet, due to the holidays, but firm. Prime western is quotable nominally at 23c to 24c for spot; 22.50c to 23.50c for July; 22c to 23c for August; 21.50c to 22.50c for September, and 20c to 22c for the balance of the year. Brass special is quotable nominally at 25c to 26c for nearby delivery and at 24c to 25c for future. A feature of the market of late has been the shyness of sellers.

The antimony market has been quiet, but demand now is somewhat better. Spot Chinese is held at 36.50c to 37.50c, duty paid. Future offerings are scarce and are held higher. Bids of 35.50c, in bond, at New York, have found no takers. There are reports of a large volume of buying in the far east on account of Russia and England.

The tin market has been quiet during the week and this condition is noted particularly today, due to the holidays. Importers, however, are expecting considerable business will develop within the next few days for July shipment. Prices are largely nominal at about 39c to 39.25c for spot, 38.75c to 39c for July, 38c for August, etc. Importers continue shy in regard to making offers of guaranteed deliveries.

The outside market on aluminum continues to be quoted at 30c to 32c with only limited offerings. The domestic producer has been making some sales at less than this figure, however, to regular customers.

Warehouse Business Improving

Cleveland, July 6.—Warehouse business in Cleveland for June was very gratifying. The leading warehouses report the best business in nearly two years, with excellent prospects for July surpassing June.

Chicago's Prospects Better

Chicago, July 7.—Settlement of the structural iron workers' strike is expected to increase business in building lines, although continuance of the lockout by material sellers probably will prove a handicap and will minimize the benefit which otherwise would follow.

Galvanized sheets are still obtainable from store at 4.85c to 5c, and steel bars are still quoted at 1.65c. Inasmuch as mill prices on steel bars have been advanced to a basis of 1.25c, Pittsburgh, an increase on steel bars from store is expected to be made shortly.

R. E. Davis, in charge of Automobile instruction in the Milwaukee continuation school since the fall of 1914, has resigned, effective July 1, to become mechanical engineer in the automobile department of the J. I. Case Threshing Machine Co., at Racine, Wis.

(*For complete prices see page* 108.)

China Asks for Scrap

Would Like Horseshoes Done Up in Special Packages —Improvement in Some Centers

New York, July 6.—China has been one of the latest nations to inquire for old material in this country. A recent inquiry from there asks for horseshoes in special packages and miscellaneous grades. Nothing has been done by sellers with this matter nor with some of the other export propositions which recently have been pending. The market continues to look a little better in this territory, although there is no important change in the volume of business or in prices, which fluctuate within rather narrow limits. The fact that one eastern Pennsylvania buyer paid around $12, delivered, recently, for heavy melting steel, whereas the top of the market had been $11.50, delivered, has aroused considerable interest. This is a new buyer, however, and even at the higher price, the New York equivalent is almost the same as for other eastern Pennsylvania points. There continues a fair demand for cast scrap at $11.50 to $12, delivered, at nearby Jersey points, depending on quantity. The razing of the Hoffman House, this city, soon, will cause the offering of about 2,000 tons of iron and steel scrap.

Still Dull

Pittsburgh, July 6.—Iron and steel scrap dealers continue to complain about the absence of demand. Most of them are asking advanced figures for all grades of scrap, but with four of the heaviest consumers of melting steel holding-up shipments, the market shows no signs of immediate activity. Low phosphorus scrap is commanding rather high prices.

Heavy Melting Advanced

Philadelphia, July 6.—Heavy melting steel in eastern Pennsylvania has been advanced 50 cents a ton to $12, delivered, under more active buying of some of the steel companies. One and possibly two works have paid this figure on transactions aggregating some thousands of tons and one of them still is in the market. Not a heavy tonnage has come out at the higher price, however, as dealers are expecting a further uplift of scrap values. The market generally is more active and higher in spots. Car wheels have sold up to $12, delivered eastern Pennsylvania, a transaction of about 1,000 tons bringing that figure. A sale of 1,000 tons of low phosphorus in which no strict guarantee of analysis was made, was made at $15.25, delivered. Re-rolling rails are higher. The Pennsylvania railroad again is asking bids on 36,000 tons of long steel rails which it has been accumulating for several months. Bids go in at Washington tomorrow on the 27,000 tons of mixed scrap at the Panama canal, now offered for sale by the government.

Firm at Chicago

Chicago, July 7.—Quickening of the steel market is beginning to have an effect on iron and steel scrap in Chicago and quotations are responding somewhat to the impulse. Dealers feel that plant operations are going ahead sufficiently to offer an active future and, as a result, prices are feeling an uplift. The change is not material, but is sufficient to indicate the trend of sentiment. No large sales have been made, but consumption has increased to an extent that will make buying necessary within a short time.

Railroad offerings are somewhat less this week than for some time. The Grand Trunk offers a list of 4,000 tons, the Wabash railway 1,700 tons, and the Kansas City Southern 400 tons.

Market Better

Cincinnati, July 6.—The iron and steel scrap market has taken on a more optimistic aspect, due to a better feeling in finished materials. Transactions are still very light and scattered, but show a tendency to improve. Prices are stronger, but are unchanged, because the large surplus of old materials in dealers' yards and available throughout the territory, will be sufficient to supply the demand for several months. Jobbing foundries are buying very sparingly and rolling mills are not making any new purchases, but the latter are asking for good shipments on old contracts on heavy melting scrap, No. 1 busheling and bundled sheet scrap.

Only Small Orders

Birmingham, Ala., July 5.—Scrap dealers report the local market is practically lifeless. There is little demand and what business is being done is in small orders. Quotations are without change.

Prices Advance

St. Louis, July 3.—Scrap prices have advanced from 25 cents to 50 cents on nearly all grades, and the market is quite firm and strong. Dealers appear willing to pay the advance for railroad material, hoping that the large consumers soon will be forced into the market. Railroad offerings for the week are: Grand Trunk, 4,000 tons; Wabash, 1,700 tons; Vandalia, 200 tons.

(*For complete prices see page* 108.)

Ferro Market

Does Not Show Much Activity—Inquiry for Fluorspar

New York, July 6.—Joining of lower-priced contracts for English ferro-manganese with some tonnages at $100, seaboard, continues. The new lots involved usually are small, as for example 200 to 300 tons done for August-September delivery. There is not much activity in spot, either where prices range from $105 to $115, delivered in carloads, depending on the locality, so that on the selling side, the situation remains relatively quiet and the interest of consumers is kept largely upon the obtaining of deliveries on old contracts for English material. It develops that not all the licenses for July shipment to this country yet have been granted, but the agents have been assured that the metal will come forward in about the expected quantities. Little new tonnage arrived the past week.

There is talk of further plans for the domestic production of ferro-manganese in the east. One of these contemplates the manufacture by the electric furnace method.

A foreign inquiry for 5,000 tons of fluorspar is current. There is also further export demand for American spiegeleisen. Better prices are being offered for this latter alloy by foreign buyers than are obtainable in the domestic market.

More Active at Pittsburgh

Pittsburgh, July 6. — Numerous inquiries for ferro-manganese for last half delivery have come out, involving about 4,000 tons in the aggregate. This alloy is being held at a spread from $100 to $115 a ton, according to delivery desired. The bulk of the tonnage sold recently has commanded from $100 to $105, seaboard. Fifty per cent and lower grades of ferro-silicon are fairly active and are firm at prevailing quotations. Demand for other alloys, including ferro-chrome, ferro-molybdenum, nickel and vanadium, is described as heavy.

The Atwood Automobile Co., Toledo, is building a $30,000 addition on Monroe street. The building will be of brick, two stories. The contract has been awarded to the Schmidt-Hardwood Co.

Fabricators Are Figuring

On Numerous Buildings and Are Pleased With Prospect for Improvement

Philadelphia, July 6.—Fabricators are impressed with the prospects for a larger future market in structural steel, and with the increasing number of proposals in this territory, which, though up to this time they have been only tentative, are now beginning to promise early action. Most of these plans involve mill buildings for ship builders, manufacturers engaged on war contracts, etc. Five to six separate propositions of this character now are pending in a general way and the outlook is that most of these will materialize after a little time. The eastern Pennsylvania mill situation is little changed. The tonnage entered in June just about equaled that of May and capacity continues employed about 70 to 75 per cent. Plain material prices move in the range of 1.20c to 1.25c, Pittsburgh, or 1.359c to 1.409c, Philadelphia. Fabricated prices are poor and reflect a low figure in running plain steel contracts with some of the shops. The Jones & Laughlin Steel Co. has taken 400 tons and the Lackawanna Steel Co. 125 tons of shapes for stock at the Panama canal.

More Jobs Are Up

New York, July 6.—The structural situation reflects some signs of betterment in this district in the larger number of new jobs that are up for figures. The tonnage, however, does not expand very rapidly, as the small and moderate-sized contract is the rule. Some exception to this condition is noted in some further extensions to war plants which now are being figured. One 5,000-ton proposition of this kind is undergoing quiet negotiations with fabricators here. Apartment house construction in metropolitan territory appears to be reviving somewhat. The estimate for the steel involved in another section of the Culver elevated railroad line in Brooklyn, now being figured upon, has been raised to 15,000 tons. Fabricated prices are kept depressed by keen competition. Going business in plain material, barring very large tonnages, falls within the range of 1.20c to 1.25c, Pittsburgh, or 1.369c to 1.410c, New York.

Shapes Reflect Improvement

Pittsburgh, July 6.—Structural shapes appear to be well pegged at 1.25c in the Greater Pittsburgh district. Fabricators and car builders are specifying more briskly than previously and the 1.25c figure seems to be well maintained.

Statler Addition

Cleveland, July 6.—The only contract of importance awarded in Cleveland during the past week was 1,500 tons for the addition to the Statler hotel, taken by the American Bridge Co. No other contracts of importance are pending at the present, but there is very fair volume of small orders.

Shapes in Demand

Chicago, July 7.—Greater activity is prevalent in the structural steel market than for many months. A number of large bridge contracts have come into the market recently and there appears to be much greater activity in smaller tonnages than prevailed for a long time. Prices remain steady at 1.44c, Chicago mill, but deliveries are not as prompt as has been the rule. One demand which has been coming to the front is for structural shapes to be used in additions to industrial plants which have taken orders for war materials and need more space to house their machinery. A number of projects of this sort are being figured on at present.

Not Awarded

St. Louis, July 6.—The contract for steel to complete the East St. Louis approach to the Municipal Free Bridge over the Mississippi river at St. Louis, which was reported to have been awarded to the American Bridge Co., the lowest bidder, has been held up, and may go to the Pennsylvania Steel Co.

President Kinsey of the board of public service, of St. Louis, has notified Boller & Hodge, of New York, the designing engineers in charge of the bridge work, to come to St. Louis at once to tabulate the bids and to report to the board the exact cost of the work.

The Pennsylvania Steel Co. was the highest bidder on the pound price, but insists it could save the city of St. Louis $79,000 on cost of the construction work. The New York engineers are expected to arrive in St. Louis Wednesday, and the awarding of the contract will be postponed until their report is made. The American Bridge Co. bids $1,035,000 on 24,000 tons of steel. The bid of the Pennsylvania Steel Co. was about $15,000 higher than the lowest figure, but it contained a voluntary agreement to put together a part of the structural steel and deliver it in St. Louis, also to loan the city of St. Louis certain heavy equipment for placing the steel in the superstructure of the approach.

(*For complete prices see page* 108.)

CONTRACTS AWARDED.

Grandstand, Wequahic Park, Newark, N. J., 400 tons, to Levering & Gerrigues.

Steel work for section No. 1 of route 29, Eastern Parkway subway, Brooklyn, 6,400 tons, awarded American Bridge Co. by general contractors, Newman & Carey.

Bridges for Lehigh & New England railway, 300 tons, to Phoenix Iron Co.

Breaker for Lehigh Valley Coal Co., Drifton, Pa., 300 tons, to Levering & Gerrigues.

Plant for Vermont Maple Co., West Rutland, Vt., 300 tons, to Belmont Iron Works.

Coal tower, Essex power station, Newark, N. J., 200 tons, to the Hay Foundry & Iron Works.

Addition to the Statler hotel, Cleveland, 1,500 tons, to American Bridge Co.

Blackstone apartment building, Omaha, Neb., 572 tons, to Paxton & Vierling Iron Works.

C. B. & Q. Ry. Co. girder spans, 500 tons, to American Bridge Co.

Modesto Irrigation District, about 600 lineal feet of flume, Gasburg, crossing in main canal, near Modesto, Cal., 500 tons, reinforced concrete.

Humboldt county, Cal., bridge across the Rel River, near Scotia, Cal., 304 tons, to American Bridge Co.

University of Illinois, vivarium and ceramics buildings, Urbana, Ill., 244 tons.

Keystone Steel & Wire Co., factory and warehouse, Peoria, Ill., 231 tons, to Decatur Bridge Co.

High school building at Fairmont, Minn., 179 tons, to A. Bolters' Sons.

Pullman Co., track system and overhead crane, Pullman, Ill., 180 tons, to American Bridge Co.

City of Moorhead, Minn., tank and tower, (300,000 gallons), 134 tons, to American Bridge Co.

Monterey county, Cal., three pin connected spans across Salinas river, near Neponsit, Cal., 122 tons, to American Bridge Co.

CONTRACTS PENDING.

Apartment house, Fortieth street, New York City, 1,100 tons, bids being taken.

Bridges for the city of Springfield, Mass., 250 tons, bids being taken.

Balch-Price store, Brooklyn, 650 tons, bids being taken.

Apartment house for the Kenmore Realty Co., Boston, 500 tons, bids being taken.

Apartment house, Fifty-first street, New York City, 1,200 tons, bids being taken.

Bridges for Baltimore & Ohio railroad, 125 tons, bids being taken.

The Toledo Cooker Co., Toledo, O., has started work on a factory addition to its plant on West Bancroft street, which will add more than 40,000 square feet to its present working space. The addition is to care for the manufacture of aluminum ware, a recent innovation for the Toledo concern.

F. H. Heath, of the Boston office of the Jones & Laughlin Steel Co., has been transferred to the Detroit office as district sales manager, succeeding F. H. Holt, resigned.

Corporation Buys Billets

For First Time in Several Years—Pencoyd Plant Will Get Part of Tonnage—Prices Advance

Philadelphia, July 6.—To take up its shortage of open hearth steel arising from the present heavy demand for products of this quality, the Carnegie Steel Co., in behalf of the Steel Corporation, has bought 10,000 to 15,000 tons of billets from an eastern Pennsylvania maker, for early delivery at several plants. The Pencoyd works at Philadelphia, it is understood, will receive part of this steel. This appearance of the Steel Corporation as a buyer of steel in the open market, for the first time in several years, has created a very strong feeling in the semi-finished steel situation, especially in the east and makers are quoting prices on billets, notably open hearth, with renewed caution. Prices are held higher and it is doubtful whether any considerable tonnage of open hearth billets now could be obtained much under $21.50 to $22, Pittsburgh, or $24.06 to $24.56, Philadelphia. A representative of a Canadian works in this city has purchased 8,000 to 9,000 tons of special quality billets with rounded corners for the manufacture of shells. A Chicago mill will supply the steel. Some difficulty was encountered in obtaining prices owing to the 40 per cent discard required under the English ammunition specifications. Other export inquiries now pending include 2,000 tons of sheet bars and 2,000 tons of 4 to 10-inch billets.

Billets and Bars Withdrawn

Pittsburgh, July 6.—More prominent manufacturers of billets and sheet bars have withdrawn from the market for prompt and future delivery. Prices continue to advance rather sharply. Open hearth material, which is somewhat scarce, is commanding more than bessemer steel. Youngstown interests are asking $20 and above for bessemer billets and $20.50 and above is being asked for open hearth billets at that center.

The billet and bar market at Pittsburgh nominally is quoted at about $1 a ton above that at Youngstown. Bessemer sheet bars are commanding $20.50 and above at Youngstown and open hearth sheet bars are listed at $21.50, that center. As high as $22.50 has been obtained for open hearth sheet bars at Pittsburgh. Forging billets are listed at $27, Pittsburgh. The Carnegie Steel Co. has closed for a tonnage of billets in the east, for shipment to the Pencoyd plant of the American Bridge Co. As previously reported, the Carnegie company has not been selling semi-finished material for several months.

May Charge

For Hauling Slag, But Not According to Tariffs Filed

Holding that tariffs filed by 11 railroads proposing charges for hauling slag from furnaces in western Pennsylvania, Ohio and West Virginia, do not conform to the act to regulate commerce, the interstate commerce commission has handed down a decision ordering the tariffs stricken from its files. The commission says, however, it sees no reason why this disposal service must be performed gratuitously by the carriers. It makes it plain that it expects the railroads to file appropriate tariffs conforming with other requirements attending business of common carriers. These tariffs are expected to be regular and be more specific than those which were on file.

Commissioner Hall dissented, holding that the service is not performed by the common carriers as such but is a matter of private service, analagous to that of a wrecker or scavenger, for which its instrumentality and facilities are peculiarly adapted and until its performance of that work in some way interferes with its ability to perform its common carrier business or amounts to the violation of the act, then neither the act to regulate commerce nor the powers thereby conferred by the commission can be invoked to restrain or regulate the performance of that service.

Tariffs were filed by 11 carriers operating in Ohio, Pennsylvania and West Virginia containing the provisions for charges of 20 cents and 25 cents per ton, net, for the disposition of waste materials. Against those tariffs protests were filed by the Carnegie Steel Co., the American Sheet & Tin Plate Co., the American Steel & Wire Co., the National Tube Co., the Cambria Steel Co., the Jones & Laughlin Steel Co., the Republic Iron & Steel Co., the Youngstown Sheet & Tube Co., the Brier Hill Steel Co. The record of the case and the decision of the commission refer directly only to this proposition as it affects the iron and steel industries.

(*For complete prices see page* 108.)

Ore Market

Is Improving—Important Consumers Increase Orders

Cleveland, July 6.—The iron ore market is at last showing some favorable indications. Important consumers having long term contracts for ore who early in the season indicated that they wished only their minimum tonnage shipped, are now giving instructions to ship in large quantities and it will not be at all surprising if the shipments for the remainder of the season are much heavier than seemed probable at the opening.

Buying Up Local Ores

Philadelphia, July 6.—Another block of 20,000 tons of local eastern ores has been sold to an eastern Pennsylvania consumer. Local New Jersey and New York state ore operations, which have been supplying cheap mineral to nearby furnaces, now have about reached the limit of capacity and with trans-Atlantic ores practically shut off by the freight situation, a rising cost of mixtures from this time, for eastern users, is expected. This promises to be a factor in bringing about an advance in pig iron. Eastern furnace managers continue to be offered some very low prices on Superior ores slightly under standard.

Ore Shipments Increase

Ore shipments on the Great Lakes during June were 6,005,091 tons as against 5,502,367 tons for June, 1914, an increase of 502,724 tons. The movement to July 1 was 11,521,283 tons, an increase of 1,897,167 over the movement to July 1, 1914, when 9,624,116 tons were brought down. If this proportion of increase is continued throughout the present season, the total movement of ore will be in excess of 40,000,000 tons.

Following are the shipments by ports with corresponding data for last year:

Port.	June, 1914.	June, 1915.
Escanaba	580,103	720,264
Marquette	262,075	363,637
Ashland	541,315	604,127
Superior	1,997,895	926,536
Duluth	1,045,786	2,146,501
Two Harbors	1,075,193	1,244,026
	5,502,367	6,005,091
1915 increase	.....	502,724

Port.	To July 1, 1914.	To July 1, 1915.
Escanaba	1,076,020	1,248,830
Marquette	383,948	547,002
Ashland	883,081	1,161,792
Superior	3,733,502	1,777,600
Duluth	1,779,876	4,295,811
Two Harbors	1,767,689	2,490,248
	9,624,116	11,521,283
1915 increase	.....	1,897,167

More Cars Are Ordered

Making a Total of About 2,500 for the Past Week—June Was Best Month of Year for Rail Orders

New York, July 6.—Additional orders for about 2,500 freight and passenger cars have been placed with the builders. The Havana Central ordered 550 flats and 100 box cars from the Standard Steel Car Co.; the Chicago, St. Paul, Minneapolis & Omaha order for 1,500 box cars was divided equally between the American Car & Foundry Co. and the Haskell & Barker Car Co. The Chicago North-Western has ordered 49 baggage, mail and passenger equipment from the American Car & Foundry Co. and from the Pullman Co. The Baltimore & Ohio inquiry for 2,000 cars for the Cincinnati, Hamilton & Dayton has been bid upon and award is expected in a few days. The Baltimore & Ohio also is in the market for 50 passenger types.

The receivers of the Rock Island have placed 17,000 tons of rails additional with the Illinois Steel Co. This system some weeks previously ordered 10,000 tons from the same mill. The bids on the 37,800 tons of 100-pound open hearth running rails, and on the 2,400 tons of open hearth guard rails, asked by the public service commission for subway and elevated extensions in Greater New York are to be taken July 16. The large Russian and French rail orders continue to be figured upon by the mills in this country.

The large Russian requirement for "dog-eared" spikes which has been before makers on various occasions recently, again is receiving attention. One report is that 10,000 tons of these spikes, or 100,000 kegs, are about to be closed. It is stated, in fact, that one independent steel company awaits but the final formality from Petrograd on the closing of a large quantity of these spikes. The 30,000-keg spike inquiry of the New York Central still is pending.

Total rail orders reported by the mills in June according to the records of *The Iron Trade Review*, amounted to 225,000 tons and were the largest of the year. This was due to the inclusion of the heavy Pennsylvania railroad order. In May, they were 140,000 tons; in April, 65,000 tons; in March, 160,000 tons; in February, 160,000 tons, and in January, 200,000 tons.

Car orders in June were 17,000, of which 9,000 came from Russia and 2,500 from France. Total orders for cars for the first six months were 43,850, made up of 2,600 in January, 4,000 in February, 1,100 in March, 1,150 in April and 18,000 in May.

Russian Cars Placed

New York, July 7. (By wire.)—The American Car & Foundry Co. is reported to have finally taken 2,000 box cars for Russia which were originally placed with the Canadian Car Co., thus increasing its order to 4,000. The Baltimore & Ohio has closed for last half spikes, estimated at 20,000 kegs or more. It is understood they went to a Pittsburgh maker. An independent steel company is offering through its export department an inquiry for 5,000 to 6,000 tons or 50,000 to 60,000 kegs of doghead spikes for Russia.

The American Bridge Co. takes an office building at Washington leased by the Southern railway, 1,200 tons.

More Activity at Chicago

Chicago, July 6.—Activity of railroads in buying track materials and cars continues and adds not a little to the large tonnage being booked by steel mills. The B. & O. railroad is in the market for 2,000 cars, which may come to western makers. Demand for spikes and bolts has been so strong that spikes have been advanced to 1.50c to 1.55c, Chicago, while bolts, which had been selling at 1.90c to 2c, are now quoted at nothing lower than the maximum.

The decision by the court allowing the receivers for the Rock Island railroad to buy 17,000 tons of rails additional, to be paid for out of earnings, has resulted in this order being placed for rolling by the Illinois Steel Co.

Columbus Bolt Works Reorganized

The Columbus Bolt Works Co., Columbus, O., has been incorporated with an authorized capital of $660,000 and has taken over the Columbus Bolt Works, of that city. The incorporators of the company are: J. R. Poste, J. H. Poste, W. F. Burdell, Beale E. Poste and S. H. Barrett. The officers are: J. R. Poste, president, treasurer and general manager; J. H. Poste, vice president; C. A. Fleming, assistant treasurer; H. A. Mason, secretary.

Under the reorganization, the control of the concern passes into the hands of J. R. Poste, who has been with the Columbus Bolt Works for many years and who recently has been secretary and general manager. W. K. Lanman was president of the Columbus Bolt Works. The new management announces that a live, progressive policy will be followed. It operates three large plants.

(*For complete prices see page* 108.)

Frick Wage Scale

Now Prevails Throughout the Connellsville Coke Regions

Pittsburgh, July 6.—The H. C. Frick wage scale, which has been regarded as the standard, now prevails throughout the Connellsville coke regions. A week ago, it was predicted that the Frick scale would be adopted by most operators who had reduced wages. Spot Connellsville coke has reflected the usual holiday strength. Some tonnages for immediate delivery have been sold at as high as $1.80, ovens. Most plants closed down over the Fourth. Mattie furnace of the Girard Iron Co., Girard, O., went out of blast last week and one of the stacks of La Belle Iron Works, Steubenville, O., also was added to the inactive list. Reports continue to be heard of numerous Italians leaving the regions to participate in the war in Europe. While it is known a large number of men have returned to Italy, yet operators say they have not yet experienced a serious labor shortage. *The Connellsville Courier*, for the week ending June 26, says production was 355,478 tons, a gain of 6,968 tons, compared with the week before.

Foundry Coke Slackens

Cincinnati, July 6.—Sales of foundry coke have fallen away, due to the fact that over 90 per cent of the foundries in this territory closed for next year's requirements during the past month. Furnace coke shows more life. A southern Ohio stack is asking for 20,000 tons, and a Virginia furnace has a tentative inquiry out for from 10,000 to 20,000 tons. Shipments to both foundries and furnaces are good and prices are strong. No changes in quotations are given in either the Pocahontas, Wise county or New River districts.

The H. & M. Screw Co., of Fostoria, O., and the Rummel Screw Co., of Cleveland, will be consolidated to form the Fostoria Screw Corporation. The company has paid in stock amounting to $100,000. The firm will locate in the property of the Fostoria Factories Co. The output of the new firm is sold in advance for four months.

Shell Loading

Is Serious Problem Confronting Canadian Manufacturers

Toronto, Can., July 7.—The recently established shell manufacturing industry of Canada is placed in a critical and uncertain position by the refusal of the British government to accept unloaded shells. At present there is only one establishment in Canada where shells can be loaded and turned out completely ready for use, and the factories now engaged in making the empty shells can turn out ten times as many as can be converted into fixed ammunition at this plant. Consequently it is doubtful whether further orders from England will be received, owing to the uncertainty of deliveries, unless some of the manufacturers or the government establish a factory for loading and finishing shells. In view of the general uncertainty of the situation and the possibility of the end of the war before the industry had gotten fairly started, there is no disposition on the part of individual manufacturers to incur the great expense that would be entailed by investing in a plant for finishing shells, and it is felt that if the industry is to continue, such action must be taken by the government or some central organization.

The Canadian government having completed the arrangements for the taking over and operation of the National Transcontinental Railway from Moncton, N. B., to Winnipeg, has ordered 15 locomotives and 1,000 box cars and will start running passenger trains from Toronto to Winnipeg over the western section of this road in connection with the Grand Trunk system and the Timiskaming & Northern Ontario Railway on July 13.

Robert E. Harris, of Halifax, president of the Nova Scotia Steel & Coal Co., has been appointed a judge of the supreme court of Nova Scotia, which will necessitate the appointment of a new president for the company.

Declare Embargo

Pittsbugh, July 8. (By wire.)—Railroads have declared an embargo against the Pittsburgh Steel Co., preventing further shipments of scrap to the plant at Monessen, Pa. Heavy melting steel is being held at $12.25 by some dealers, but no recent sales have been made.

The Kissel Motor Car Co., Hartford, Wis., is so rushed with orders for pleasure cars and trucks that it is finding difficulty in getting sufficient skilled help. Advertisements are being published in Milwaukee and Chicago papers for experienced machinists for milling machines, universal grinders, drill press and all around machine hands.

Cleveland Furnace

Passes Into Control of Wm. G. Mather and Associates

Announcement is made that Wm. G. Mather and associates have purchased the interest of Rogers, Brown & Co. in the Cleveland Furnace Co., of Cleveland. The deal was closed last week, and Mr. Mather and his associates took hold at once. Mr. Mather becomes vice president of the company, and *The Iron Trade Review* is advised that no other changes in the personnel or policy of the company are announced at this time. The iron will be sold by Rogers, Brown & Co. as in the past.

The Cleveland Furnace Co. is a producer of standard grades of merchant pig iron and will continue in the trade as usual.

Will Co-operate With J. P. Morgan & Co.

D. A. Thomas, the Welsh coal operator who has been sent to this country and Canada by the British government to look after the shipments of ammunition and other war supplies, arrived at New York on the American liner St. Louis, July 5. Mr. Thomas announces that in no sense will he supersede J. P. Morgan & Co. as purchasing agent for the British government, but will co-operate with that firm.

Pig Iron Market Improving

Philadelphia, July 8. (By wire.)—The Thomas Iron Co., Easton, Pa., has closed a large tonnage of No. 2X iron at $14, furnace, and in addition has sold 1,500 tons of No. 3 foundry iron for pipe foundries for early delivery at 25 cents a ton above the price at which tonnages to this pipe works were sold five weeks ago. Gray forge iron is bringing $13, furnace, and No. 2 plain Thomas-vanadium has been sold at $13.75, furnace, to an eastern sanitary works. Indications point to a continued upward trend of the pig iron market and the trade is optimistic over the outlook.

Effective today, the Thomas Iron Co. advanced prices 25c per ton on No. 2X, making it $14.25, furnace.

The plant of the Youngstown Iron & Steel Co., Youngstown, has closed down for repairs. Work will be resumed July 12.

Strike Settled

And Both Employers and Employes Score Points

Chicago, July 6.—Structural iron workers will return to work at once in Chicago, the strike which began May 1 having been settled at a conference Saturday afternoon, July 3. The workers gained an increase in pay, the new agreement calling for the present wage of 65 cents per hour for one year, 69 cents the second year and 70 cents per hour the third year. The employers gained a point in the adoption of the uniform agreement, with arbitration provisions, which has been championed by President Simon O'Donnell, of the Chicago Building Trades Council, and Charles W. Gindele, president of the Building Construction Employers' Association. Both these men and Joseph L. McClory, international president of the iron workers, Indianapolis, participated in the conference which resulted in settling the dispute.

The men will return to work at once, about 1,000 being involved, and construction will go forward in all cases where material is ready. This includes bridges, cribs and other structures for the city which have been held up for several months. The lockout by material men will handicap operation somewhat, but sufficient is now ready to employ practically all the members of the organization for some time.

Break Records

Middletown, O., July 6.—All records for one month's business were broken in June by the American Rolling Mill Co., and the last week in June was also the biggest week in the history of that corporation. This announcement was made following a recent meeting of the board of directors of the company. The plant is running full in all departments, mostly on indirect war orders.

Order for Lathes

The Hamilton Machine Tool Co., Hamilton, O., has given an order to the C. Lee Cook Mfg. Co., Louisville, Ky., for a large number of 24-inch engine lathes. They are for foreign delivery, and will be shipped direct. The Louisville company is also receiving a good volume of business in metallic packing, its regular line, and, as a consequence of the order referred to, it has put a night force at work, and will run its plant night and day for several months. No additional equipment will be installed in the Cook plant, however.

Present Striking Contrast

British Pig Iron Steady, But Prices of Finished Lines Change Frequently—Spelter Drops

Office of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., June 25.

We have been fairly shaken out of our fool's paradise during the past few days by the German seizure of Lemberg in the one direction, and in the other by Lloyd George's grave warning as to the "dire peril" threatening us from the shortage of ammunition. There is sufficient reason to believe that Russia's severe set-back is, likewise, due to an unexpected demand for high explosive shells and machine guns. At the same time, there is a feeling of relief that we know the whole truth, and already the nation is rising to the occasion, as a register is being made of available machinery, and in every large center thousands of skilled machinists, hitherto employed on relatively unimportant work, have enrolled themselves, eager to "do their bit" in maintaining the safety of their country and empire. In three months there should be an avalanche of shells sufficient to reproduce a kind of Sodom and Gomorrah fire storm over the heads of the invading Germans. Meantime, the democracy are rushing to the provision of silver bullets, no less necessary for the satisfactory termination of the war. Just as the town halls are thronged with industrial recruits, so the thrifty small saver is besieging the post office, even to the smallest suburban and village branch, to invest his savings of 5s or more, and the result should be a record financial accumulation, which should place the chancellor of the exchequer in a very powerful position. The war hitherto has seen nothing like such a rallying of the democracy to meet the national emergency. Unfortunately, as usual in our wars, the awakening has come somewhat late, and if this organization of money and of labor had come six months earlier we all realize that our position would have been very much better. In the meantime, Germany is bell-ringing and flag-waving. But this does not disturb us; our turn will come later. It is understood that recruiting still continues entirely to the satisfaction of the authorities, and compulsion seems farther off than ever.

Pig Iron Steady

The pig iron market continues remarkably steady, thereby showing a somewhat striking contrast to finished materials of all kinds, the values of which are never the same two days together. The Cleveland market has really given way a little, the decrease on the week being 1s 3d (30c) per ton for warrants. Makers' iron has not given way quite to the same extent. Yesterday's quotation at Cleveland was 66s 4d ($15.92), with 66s 9d ($16.02), one month. There are no quotations for three months. The discouragement of long contracts is general in all districts in view of the great uncertainty with regard to the future. Makers of pig iron, however, are very disappointed with the position, because, in view of dear fuel and generally expensive production, their profits are approaching the vanishing point, while the difficulties of operating furnaces are greater than ever.

Business in East Coast hematite pig iron is not quite so strong and mixed numbers can be bought for £5 ($24), early delivery. The scarcity of coke continues a strong element in the market.

Finished Iron and Steel.

It is difficult to keep pace with price increases of finished materials generally. The market for finished iron is almost unmanageable, and there is every probability of a famine within the next six months. During the past week the Black Country mills have refused business totaling hundreds of tons. It has become impossible to undertake deliveries at any specifieed time. Many country merchants, sending their orders to Birmingham warehouses during the past week, have been definitely refused. Stocks have run down almost to the danger point, and large Birmingham dealers are now discriminating carefully between their customers, so that new applicants have no chance whatever of receiving attention. The owners of Staffordshire mills are demanding a premium of at least 15s ($3.60) a ton for the supply of iron during August. The recognized figure for current delivery of common iron is £11 5s ($54), and forward premium upon this is 15s ($3.60). This brings the selling figure to the current price for best iron. The market is completely disorganized, and production has become unprofitable in numbers of cases. There is no available surplus of labor. Consequently, if one workman of a mill set is off duty either through ill-health or slackness the mill has to stand.

An unexpected development at yesterday's meeting was a drop in the price of spelter from £115 ($552) a week ago to £87) ($417.60). There is more than a suspicion that this market has been deliberately cornered notwithstanding the fact that spelter is emphatically a war material. Government officials have intimated that the matter is receiving their attention. Before the war spelter was selling at £21 ($100.80), so the increase was nearly 600 per cent. They are already suffering from their ruthless treatment of galvanized sheet makers, who are no longer among their customers. At yesterday's meeting there were some quotations of £23 ($110.40) per ton for galvanized sheets, but they seem to have been nominal, no business resulting.

While steel is scarce, production is much more even and satisfactory than that of iron. In this department also, American supplies are coming much more effectually to the rescue. In spite of high freights, American steel is selling here at prices substantially below the English article, and increasing importations are looked for until the end of the war. The complaints of a few months ago as to certain irregularity of quality seem to have disappeared, and consumers are very appreciative of the improving regularity of supplies, while the system adopted by some American exporters of accompanying their consignments with analyses is highly appreciated, and is stimulating business in all directions. The importing merchant is especially pleased that he is able to inform his customer exactly what the latter is receiving, so that he can modify his treatment accordingly.

British wire makers are depending increasingly on America for their wire rods. Much to their satisfaction, the railways are handling the imports with better success, and there are fewer complaints of consignments being held up at the ports for outrageously long periods. The British price for bessemer billets is £7 15s ($37.20), delivered, with pro rata increases for high carbons. There are practically no open hearth billets available, the government insisting on its claims to use this material for war purposes. There are no definite steel increases to record at the moment, but an advance in joists is looked for within the next few days.

Quite a large quantity of American steel is being used up in Sheffield, an importation which may be described as a new variant of the practice of bringing coals to Newcastle.

(*For complete prices see page* 108.)

Money and Iron: Fact and Comment

Selling of American Securities By European Holders Has Depressing Effect —Slight Decline Caused By Shooting of Mr. Morgan

THE policy which foreign holders of American securities have been compelled to adopt of selling those securities in order to help their countries in floating more war loans, has had a depressing effect on the stock market during the past week and has been even more noticeable in the bond market. Although the city of New York disposed of $71,000,000 in bonds, the largest single offering in its history, all the bonds were awarded on the basis of 4.30 to 4.40 per cent, compared with a basis of 4.25 on an issue just marketed by the city of Chicago. There was some disappointment, but this was not in the best informed circles, where it was not expected that the New York bond issue would be disposed of on as favorable terms as would have been possible if Europe had not been selling American stocks.

Of course, it is to be regretted that American municipalities will be compelled to pay high interest on their bond issues on account of the European war, but after all, the influence of Europe may be salutary in preventing American securities from too rapidly advancing, as would probably be the case if, in the absence of depressing influences abroad, industrial conditions should continue to improve as they promise to do.

Reports indicating improvement in earnings by the Pennsylvania, New York Central, the Erie and other railroads were a favorable factor of the week. The shooting of Mr. Morgan, which was confirmed about two hours before the close of the market Saturday, caused a shock and slight declines.

Quotations at the close of business July 3 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

	Close July 3.	Net change.
Amer. Brake Shoe & Fdy. Co., ctfs.	104	+1
Amer. Brake Shoe & Fdy. Co., prfd.	...	.....
American Can	46	+ ½
American Can, prfd.	102⅛	+1⅛
Amer. Car & Fdy. Co.	54¼	—1
Amer. Car & Fdy. Co., prfd.	113⅜	+ ⅝
American Locomotive	48	—3¼
American Locomotive, prfd.	98⅜	+1⅜
American Steel Foundries	37	—3
Baldwin Locomotive	66½	—1
Baldwin Locomotive, prfd.	102	— ½
Bethlehem Steel	166½	—4
Bethlehem Steel, prfd.	116	— ½
Colorado Fuel & Iron	30¼	—1⅜
Continental Can	67	—1
Continental Can, prfd.	98	—1
General Electric	167¾	—3¼
International Harv. of N. J.	98¼	—2½
Inter. Harv. Corp.	....	.....
Inter. Harv. Corp., prfd.	99	+2
Nat'l Enamel'g & Stamp. Co.	17	—1⅛
Nat'l Enam. & Stp. Co., prfd.	85	.....
Pressed Steel Car	48	—1¼
Pressed Steel Car, prfd.	99⅜	+1¼
Pullman Palace Car	157½	—2½
Republic Iron & Steel Co.	29	— ¾
Republic Iron & Steel Co., prf.	87⅛	—1⅛
U. S. Cast Iron Pipe & Fdy.	13¾	— ⅜
U. S. C. I. Pipe & Fdy., prfd.	37	—3
United States Steel	59¾	—1½
United States Steel, prfd.	109¾	— ⅜
Westinghouse Mfg.	98¼	— ¾

Held Abroad

New York, July 7.—In view of the reports that Europe now is liquidating its American securities in the market on this side to satisfy its large unfavorable trade balances for war supplies, renewed interest is directed on the probable quantity of such holdings in foreign hands. As to Steel Corporation shares, Dow, Jones & Co. recently have compiled statistics showing that in 1914 there were 1,519,569 shares, of which 278,341 shares were preferred and 1,241,128 were common stock. At the present market price of these stocks, it is figured that these securities are valued at about $105,000,000. The largest foreign holder of steel remains the Dutch Syndicate of Amsterdam, with 356,290 shares of common and 27,230 shares of preferred.

L. F. Loree, president of the Delaware & Hudson railroad, has prepared statistics showing that approximately $2,576,401,342 of American railroad securities, par value, are held in Europe at the present time. Of this large total, $633,802,162 is represented by common stock, $161,280,900 by first preferred and $99,900 second preferred stock. The remainder, $1,781,318,380, comprises notes, receivers' certificates and various classes of bonds.

Will Sell Some Plants

Creditors of the M. Rumely Co., Laporte, Ind., have been notified by Receiver Mount to file all claims within 60 days, when Judge Anderson will pass on the receiver's report and re-organization will take place. The plants at Toronto, Ont., Richmond, Ind., and Stillwater, Minn., will be sold and manufacturing concentrated at Laporte and Battle Creek.

It is understood the reorganization plan of the M. Rumely Co. provides for an assessment of $17 a share on the preferred and $1 a share on the common stock to raise about $2,000,000 working capital.

An underwriting plan may be arranged to take care of shareholders who decline to pay the assessments. The company's capitalization is to be cut and new stock exchanged for the present shares on the payment of the assessment. Part of the proceeds of the assessment may be used to liquidate about $1,500,000 indebtedness at the banks. The company has a cash equity of nearly $400,000, which can be obtained upon payment of these bank debts.

A large majority of two-year 6 per cent convertible notes and 6 per cent commission notes of the Rumely Co. has been deposited with the noteholders' committee, of which John W. Platten is chairman.

Toledo Furnace Bonds

The Cleveland Trust Co. and the Guardian Savings & Trust Co., Cleveland, last week announced public offering of $1,500,000 Toledo Furnace Co. first mortgage 6 per cent bonds, dated July 1, 1915, and due serially from July 1, 1918, to 1932, inclusive. They will be sold at par and interest. The Toledo Furnace Co. is controlled by Pickands, Mather & Co., Cleveland. It owns 103 acres on the Maumee river at Toledo, on which are two blast furnaces with a capacity of 800 tons daily. The land and plant alone have an estimated value of $3,800,000 and the company is well supplied with other assets. Dividends of 8 per cent per annum have been paid on the $2,000,000 outstanding capital stock since 1907, and to May 31, this year, a surplus of nearly $1,400,000 had been accumulated. Net earnings, after allowing liberal depreciation charges, have averaged, since May, 1907, $271,464 per year. As previously noted, the proceeds of the issue are to be used in the construction of a by-product coke plant of 94 ovens with a daily capacity of 1,000 tons of coke.

British Steel Men Cheerful

This week's report of British steelmaking firms shows that they have benefited as a result of the large output. Messrs. John Brown & Co. pay a dividend of 12½ per cent and show a profit of £521,000, which is a record for the company and an improvement of 2½ per cent on the achievement of a year ago. The Ebby Vale Steel, Iron & Coal Co. reports that 5,000 of its 12,000 workpeople have joined the colors. The profits for the year were £160,000, and they are able to pay a dividend of 7½ per cent.

Big Gain Shown in Pig Iron Output

June Production Largest in 20 Months—More Stacks Blowing In—

Merchant Furnaces Show Large Increase in Output

THE rapid recovery shown by the blast furnace industry since December was maintained during June. The production of coke and anthracite pig iron last month was 2,369,932 tons, compared with 2,255,157 tons in May, a gain of 114,775 tons.

This total is the largest in 20 months, or since October, 1913. Compared with December, the low point of pig iron production for several years, June shows a gain of 875,000 tons, or 59 per cent. For the first six months of the year the total production was 12,043,503 tons, a gain of 1,445,000 tons, or 14 per cent, compared with the second half of 1914, and only 339,000 tons less than the production in the first six months of that year. Pig iron was produced in June at the rate of 28,850,000 tons, which compares with an actual output of 23,000,000 tons in 1914.

There was a net gain of 14 in active stacks, bringing the total number in blast up to 221. More stacks were active on June 30 than at any time since March, 1914. November marked the low point in number of active stacks, and using this month as a base, June shows a gain of 71 stacks, or 47 per cent.

The daily average production in June was 78,998 tons, against 72,747 tons in May, a gain of 6,251 tons. The merchant furnaces made a larger proportionate share of the gain in June than during any month for several years. The output of merchant iron in June was 575,077 tons, against 533,781 tons in May, a gain of 41,296 tons. The daily average production of merchant iron in June was 19,169 tons, against 17,219 tons in May, a gain of 1,950 tons. The steel works or non-merchant furnaces produced 1,775,459 tons in June and 1,706,056 tons in May, a gain last month of 69,403 tons. Their average daily output last month was 59,182 tons, against 55,034 tons in May, a gain of 4,148 tons.

Six merchant furnaces were relighted last month and two blown out, a net gain of four. Eleven steel works furnaces were blown in and one blown out, a net gain of 10.

The production of ferro in June was 9,379 tons, against 6,889 tons in May, a gain of 2,490 tons. The production of spiegel last month was 10,017 tons, against 8,431 tons in May, a gain of 1,586 tons.

The merchant furnaces relighted last month were: Pioneer No. 1, Republic Iron & Steel Co., June 3; Canal Dover, M. A. Hanna & Co., June 18; Brooke No. 3, E. & G. Brooke Iron Co., June 8; Josephine No. 1, Corrigan, McKinney & Co., June 8; Rockdale, J. J. Gray Jr., June 23, and Mayville "B", Northwestern Iron Co., June 4. One Iroquois, Iroquois Iron Co., and Lock Ridge No. 7, Thomas Iron Co., were blown out.

Among the steel works furnaces relighted were: South Works No. 3, Illinois Steel Co., June 3; Gary No. 12, Indiana Steel Co., June 25; La Belle No. 1, La Belle Iron Works, June 8; Martins Ferry, Wheeling Steel & Iron Co., June 16; one Donora, American Steel & Wire Co.; two Edgar Thomson, one Clairton, June 5, and Sharon, June 22, Carnegie Steel Co.; Monongahela No. 3, National Tube Co., June 7. La Belle No. 2 was put out of blast on June 30.

Crane No. 1, Empire Steel & Iron Co., which had been banked since Dec. 13, was put in blast June 13. Mattie, Girard Iron Co., was blown out July 1. Top, Wheeling Steel & Iron Co., resumed June 2, after being banked since May 24. Hokendauqua No. 1, Thomas Iron Co., which was banked May 20, resumed June 7.

MONTHLY PRODUCTION.

	1915.	1914.	1913.
January	1,591,024	1,879,336	2,787,800
February ...	1,666,592	1,888,607	2,578,670
March	2,046,280	2,341,551	2,762,823
April	2,114,518	2,261,501	2,754,353
May	2,255,157	2,097,019	2,816,825
June	2,369,932	1,904,566	2,616,883
Total 1st half	12,043,503	12,372,580	16,317,354
July	.....	1,955,324	2,558,275
August	.....	1,996,483	2,537,018
September .	.....	1,882,718	2,494,098
October	.....	1,767,227	2,539,924
November ..	.....	1,501,269	2,229,960
December ..	.....	1,495,325	1,976,138
Total 2d half.	.....	10,598,346	14,335,413
Grand total	12,043,503	22,970,926	30,652,767

AVERAGE DAILY PRODUCTION.

	1915.	1914.	1913.	1912.
Jan. ...	51,323	60,624	89,929	66,220
Feb. ...	59,521	67,450	92,095	72,372
Mar. ...	66,009	75,534	89,123	77,791
Apr. ...	70,484	75,383	91,812	79,254
May ...	72,747	67,646	90,865	80,753
June ...	78,998	63,486	87,229	81,125
July ...	.....	63,075	82,525	77,502
Aug. ...	.....	64,403	81,839	80,650
Sep. ...	.....	62,757	83,137	81,482
Oct. ...	.....	57,007	81,933	86,569
Nov. ...	.....	50,042	74,322	87,985
Dec. ...	.....	48,236	63,746	89,590
Average	66,539	62,934	83,980	80,124

JUNE PIG IRON.

States.	No. of stacks.	No. in blast last day of month.		Total tonnage made.		——Totals.——	
		June.	May.	Merchant.	Non-Merchant.	June.	May.
Pennsylvania	157	94	86	143,634	862,364	1,005,998	930,128
Ohio	73	48	46	118,980	455,890	574,870	569,091
Alabama	45	18	17	122,309	36,451	158,760	146,172
Virginia	22	5	5	20,526	.....	20,526	21,995
New York	26	16	16	74,859	97,816	172,675	174,983
New Jersey	6	1	1	6,240	.....	6,240	6,612
Illinois	26	12	12	21,744	145,365	167,109	164,331
Colorado	6	2	2				
Indiana	10	10	9				
Maryland	4	2	2				
Wisconsin	6	3	2	22,587	171,066	193,653	175,471
Kentucky	7	1	1				
West Virginia	4	1	1				
Tennessee	18	5	4				
Washington	1	0	0	20,677	6,507	27,184	27,418
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1				
Michigan	3	2	2				
Missouri	1	0	0	23,521	.....	23,521	23,636
Spiegel—All states...						10,017	8,431
Ferro—All states....						9,379	6,889
Totals	421	221	207	575,077	1,775,459	2,369,932	2,255,157

A Different Firm.—William Jacks & Co., of 5 East India avenue, London, and 111 New street, Birmingham, Eng., ask *The Iron Trade Review* to state that they are not connected with the Glasgow firm of the same name which has been prosecuted in Edinburgh by the government under the trading with the enemy acts; that no member of their firm has any interest in such Glasgow firm; and that no member of such Glasgow firm has any interest in their firm.

The shops of the Mobile & Ohio railroad, at Murphyboro, Ill., which have been practically idle since last October, resumed operations on July 1 with a full force working nine hours a day.

Fixing the Elastic Limit Standard

Practical Work With Extensometer Demonstrates That Commercial Tests May Be More Accurate Than They Usually Are at the Present Time

BY T. D. LYNCH

THE term "elastic limit" has come to be used with so many interpretations that when we hear it we at once ask ourselves what it means, and what we are to understand when told that the elastic limit shall have a given value. This confusion prevails even among testing engineers and metallurgists as well as among civil, electrical and mechanical engineers, and other users of material of construction. In 1912, H. F. Moore presented a valuable paper on "The Physical Significance of the Elastic Limit" to the sixth congress of the International Association for Testing Materials at New York, giving four distinct meanings of the term "elastic limit" and sounding the keynote in saying that the indefiniteness of the term 'elastic limit' makes the establishment and use of a distinctive nomenclature highly desirable."

Last year the committee report accepted by the American Society for Testing Materials defined the elastic limit as the "least load per square inch which produces a permanent set as indicated by an extensometer." The committee further stated that this determination was rarely made in the commercial testing of materials. This definition is correct and well chosen, but while the elastic limit is rarely determined as thus defined, the term itself is in general use, and the tendency is towards further confusion rather than clarification.

A study of a stress-deformation diagram of a tension test, as shown in Fig. 1, is introduced in order that we may more easily understand and appreciate the existing conditions. The elongation is proportional to the load applied up to point P, which point represents the limit of proportionality or "proportional limit". Above point P there is a slight increase in the ratio of elongation to the load applied, until Y, the yield point, is reached. Here there is a rapid and persistent further increase in the elongation, even though no further load is applied. Further loading produces a yielding of the test specimen up to M, the point of maximum stress, and this is followed by a reduction in the loading, until R, the point of rupture, is reached. The elastic limit, as defined, lies above but close to point P, whereas the elastic limit as understood by many users of this term, lies at some indefinite point on the curve, either at P, between P and Y, or at Y.

We are accustomed to hear the free use of the following ten distinct terms, namely, proportional limit, permanent set, true elastic limit, apparent elastic limit, commercial elastic limit, elastic limit by extensometer, elastic limit by drop of beam, elastic limit by dividers, and yield point. The first term, proportional limit, is very generally understood to be at point P on the curve, and the tenth term, yield point, at the point Y, whereas the other eight designations are located on the curve, more or less indefinitely, between the points P and Y, depending upon the interpretation peculiar to different engineers.

In Fig. 2 are shown characteristic stress-deformation curves of tests made on the same rod of steel, the several test specimens differing only in heat treatment. The samples were taken from a rod ¾-inch in diameter, having a chemical analysis of carbon, 0.15, manganese, 0.41, phosphorus, 0.006, and sulphur, 0.065 per cent. The rod was cut in 5-inch lengths from which were prepared six test specimens, A, B, C, D, E and F. The treatments given to these specimens were as follows:

Specimens A and B, no treatment; Specimen C, annealed at 825 degrees

Table I.

PHYSICAL TEST RESULTS ON SPECIMENS WITH DIFFERENT HEAT TREATMENTS.

Specimen.	Tensile strength, lb. per sq. in.	Yield point, lb. per sq. in.	Apparent elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.	Ratio of yield point to tensile strength.	Ratio of apparent elastic limit to tensile strength.	Difference of ratios.
A	52,100	34,500	33,250	45.0	70.3	66.2	63.8	2.4
B	51,625	.....	.....	41.0	68.2	....	....	....
C	50,000	31,000	19,000	38.5	72.9	62.0	38.0	24.0
D	72,250	58,500	51,250	22.2	70.3	81.0	71.0	10.0
E	68,375	49,500	23,500	29.2	65.9	72.4	34.4	38.0
F	123,425	107,750	43,500	4.5	20.6	87.2	35.2	52.0

Note.—A quench-bend test was also made on the full-size, ¾-inch round, the treatment being the same as that of test specimen C, in which the piece was bent flat on itself without showing signs of fracture.

From a paper read at the eighteenth annual meeting of the American Society for Testing Materials, held at Atlantic City, N. J., June 22-26, 1915.

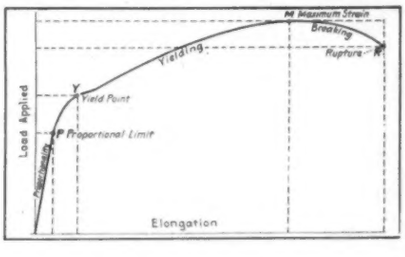


FIG. 1 — STRESS DEFORMATION DIAGRAM OF A TENSION TEST

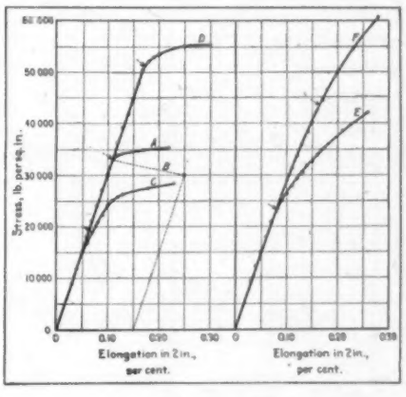


FIG. 2—VARIATIONS IN SPECIMENS FROM THE SAME BAR, DUE TO DIFFERENT HEAT TREATMENT

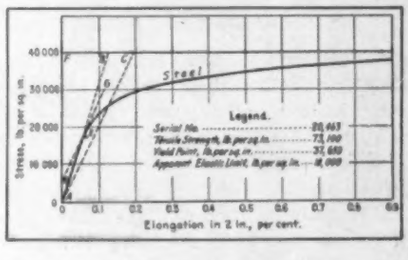


FIG. 3 — METHOD OF LOCATING APPARENT ELASTIC LIMIT

Cent.; Specimen D, quenched in water from 810 degrees Cent. and then drawn at 500 degrees Cent.; Specimen E, quenched in water from 650 degrees Cent.; Specimen F, quenched in water from 860 degrees Cent. The physical test results are given in Table I.

The values for yield point were determined by the dividers and those for apparent elastic limit were determined

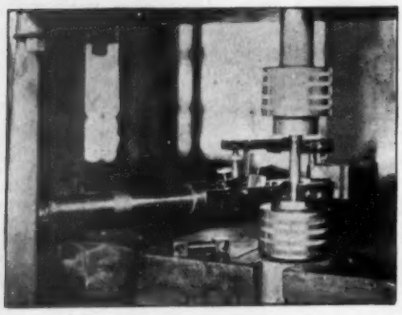


FIG. 4—MODIFIED FORM OF EWING EXTENSOMETER

by the method described by J. B. Johnson, in "Materials of Construction". The test curves were plotted as shown in Fig. 3. The line *AB* is drawn tangent to curve at *A*. The distance *BC* equals one-half the distance *FB*. The line *AC* is drawn through the points *A* and *C*. The line *DG* is drawn parallel to line *AC* and tangent to the curve at *E*. The apparent elastic limit is located at the point of tangency, *E*.

Attention is called to the difference in the ratio of yield point to tensile strength and apparent elastic limit to tensile strength as shown in Table I. These differences are not exaggerated, but are such as are frequently found in tests of steel as well as of other metals. Here we have differences between the yield point ratio and the apparent elastic limit ratio to the tensile strength of from 2.4 to 52 per cent, and yet all of the test samples were taken from the same bar of steel. The smallest difference in ratio was found on specimen A, which was tested as received from the hot mill, and the greatest difference in ratio was found on specimen F, which was tested after quenching in water from 860 degrees Cent.

Terms Must be Definite

These tests further illustrate the fact that there is a real difference of varying magnitude between points *P* and *Y* of Fig. 1, and emphasize the importance of definiteness in the use of those terms which designate that quality of steel or other material, under stress, which determines the load that may safely be put upon it.

Again referring to Fig. 2, curves *A* and *B* illustrate an important phenomenon occurring at or just above the proportional limit. Tension tests were made on two samples cut from the same rod and without additional treatment. We would expect similar results to be obtained from the two samples.

Specimen A was tested in the usual

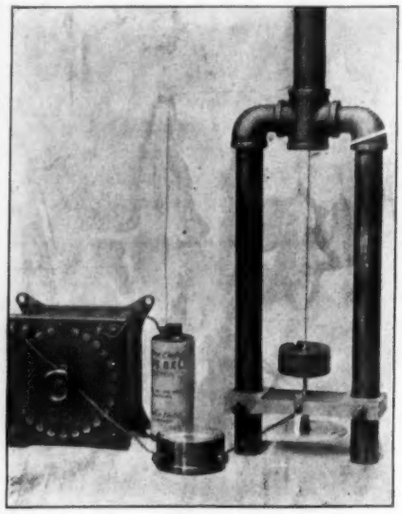


FIG. 5—APPARATUS FOR TESTING 240-INCH SAMPLES OF WIRE

manner, and the apparent elastic limit was found to be 33,250 pounds per square inch. Specimen B was tested by first applying a load of 30,000 pounds per square inch, this load being left on for 30 minutes and then removed, the extensometer returning to zero. A load of 33,000 pounds per square inch was then applied and the extensometer indicated that the proportional limit had been exceeded. The specimen at once began to stretch, and in less than a minute it had stretched 1.5 per cent. No additional load had been added, but on the contrary, the load had fallen to 30,000 pounds per square inch, as shown by the dotted line *B*, in Fig. 2. These tests were made in the physical laboratory of the Westinghouse Electric & Mfg. Co. on a 150,000-pound Olsen testing ma-

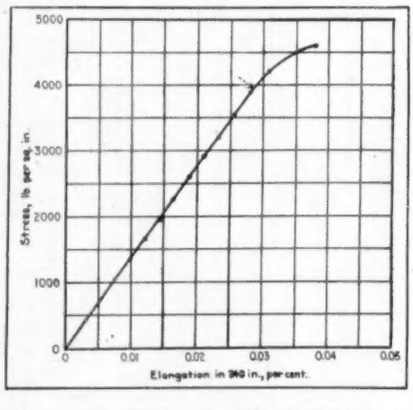


FIG. 7 — STRESS DEFORMATION DIAGRAM OF ANNEALED COPPER WIRE

chine, in accordance with the usual practice of the laboratory, as follows:

The standard test specimen adopted by the American Society for Testing Materials is used, except that the shoulder adjacent to the threaded ends is cut to ⅝-inch in diameter, to provide room for clamping the extensometer in position. To simplify the computation of the unit stress, the diameter of the

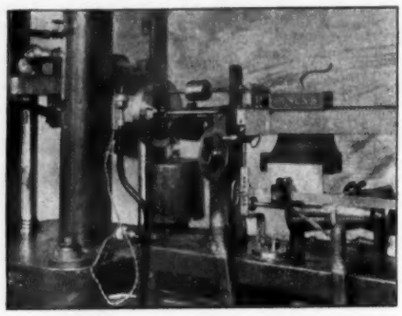


FIG. 6—ATTACHMENT FOR RECORDING THE LOAD ON THE SCALE BEAM

reduced section is made 0.505 inch instead of 0.500 inch. This gives an area of 0.2 square inch.

A modified form of the Ewing extensometer is used, as shown in Fig. 4. The original instrument was modified to give an open side so that the instrument can be removed from the test specimen without taking it out of the machine. The distance between prick points is 2 inches instead of 1¼ inches. This instrument is graduated to measure directly to 0.0001 inch, and the readings are observed through a microscope. For the convenience of the operator a card, graduated in spaces equal to the spaces on the beam, is mounted on the poise of the testing machine, and in front of this is mounted a magnetically operated prick point, so arranged that a record of the load on the beam can be made by simply pressing the contact button. This feature is shown in Fig. 6. The extensometer is attached to the specimen by means of two pairs of sharp thumb screws, so spaced that the length of the specimen included between the points is exactly 2 inches.

Method of Testing

The poise on the testing machine is set at zero and the cross-hairs of the extensometer are adjusted to read zero. The testing machine is then run at a speed of 0.034 inch a minute. When the extensometer indicates an elongation of 0.0002 inch, the operator, observing the elongation, presses the button and records the load on the card. Likewise at 0.0004, 0.0006, 0.0008 inch, etc., until the elastic limit of the material has been exceeded. The machine is then stopped

and the instrument removed, thus completing the part of the test requiring the use of the extensometer.

The dividers are next placed in the holes made by the prick points on one side of the test specimen, and the machine is run at a speed of 0.06 inch per minute until the stretching increases rapidly, as indicated by one end of the dividers leaving the hole. This reading is recorded as the yield point. The machine is then run at a speed of 0.093 inch per minute until the maximum load has been reached and the test specimen begins to show a reduction in sectional area. The speed is then increased to 0.66 inch per minute until the specimen is ruptured.

The procedure outlined above is followed in the testing of steel, but when testing brass a slight modification is made in the speed of the machine. After the proportional limit has been passed, a speed of 0.093 inch a minute is maintained up to the yield point, and the speed is then increased to 0.66 inch per minute until the specimen is ruptured.

Usefulness of Apparent Elastic Limit

We have found that the apparent elastic limit determined in this way is useful for at least two reasons. First, it is a reliable and sufficiently accurate guide to indicate how much stress can safely be applied to materials subjected to alternating or intermittent stress. Second, it is a definite value which can be duplicated by different operators.

The apparent elastic limit thus obtained has stood the test for a number of years and so far has not been found wanting, while on the other hand, the yield-point determination has been found of little value, especially in the application of those materials which have a long sweeping curve between points P and Y, as shown in curves E and F of Fig. 2.

A further series of tests was made on one specimen each of copper wire, iron wire, and steel wire, in order to more closely study the shape of a stress-deformation curve when tested with an accuracy of 0.0001 inch in a gage length of 240 inches, or 0.000000417-inch per inch of length.

Table II.

RESULTS OF TESTS ON WIRES.

Sample.	Material.	At or below the proportional limit, lb. per sq. in.	At or above the elastic limit, lb. per sq. in.	Apparent elastic limit, lb. per sq. in.
A	Copper	3,970	4,280	3,980
B	Iron	25,860	26,430	26,080
C	Steel	97,640	98,430	98,000

The apparatus for this test consisted of a 2-inch iron pipe of sufficient length to test a sample of wire 240 inches long, suspended inside of it. The wire was clamped rigidly at the top of the pipe and a weight, which could be varied, was suspended from the lower end of the wire. The lower end of the pipe shown in Fig. 5 was forked so that a cross-bar could be clamped to it and on this cross-bar was mounted an insulated micrometer screw with a large dial reading directly to 0.0001 inch. A steel ball was mounted in the lower side of the weight support, this ball making electrical contact with the end of the micrometer screw.

The temperature was maintained approximately constant by passing a gentle current of air through the pipe from top to bottom. A thermometer was mounted at the lower orifice of the pipe and any change of temperature observed. Provision was made so that weights could be varied in increments of 0.1 pound for the copper wire and 0.5 pound for the iron and steel wires.

Wire diameters were selected so that the stresses necessary to produce permanent set would be within the capacity of the apparatus. The annealing and straightening of the wire, before test, was accomplished by suspending the wire with a weight attached to it, and then heating the wire electrically until permanently straightened by the suspended weight. The approximate proportional limit and permanent set were determined by applying weights which stressed the wire nearly up to the predetermined proportional limit and then adding and removing increments of load until a further single increment produced the first permanent set. The greatest load that did not produce a permanent set was truly below the proportional limit, while the least load that did produce a permanent set was equally certain to be above the elastic limit.

Results of Wire Tests

The results of these tests are shown separately in Figs. 7, 8 and 10, and all are combined in Fig. 9, in which A represents the test on 0.052-inch diameter copper wire annealed, B represents the test on 0.034-inch diameter iron wire annealed, and C represents the test on 0.029-inch diameter steel music wire annealed. Table II gives the results of these tests. It also shows the relation of the apparent elastic limit to the proportional limit, or a value just below the proportional limit; and the relation of the apparent elastic limit to the elastic limit, or a value just above the elastic

(*Continued on page* 108b.)

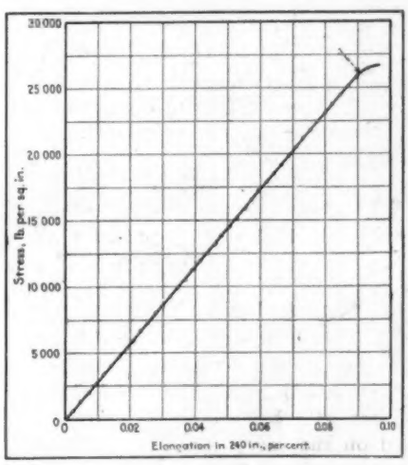


FIG. 8 — STRESS DEFORMATION DIAGRAM OF ANNEALED IRON WIRE

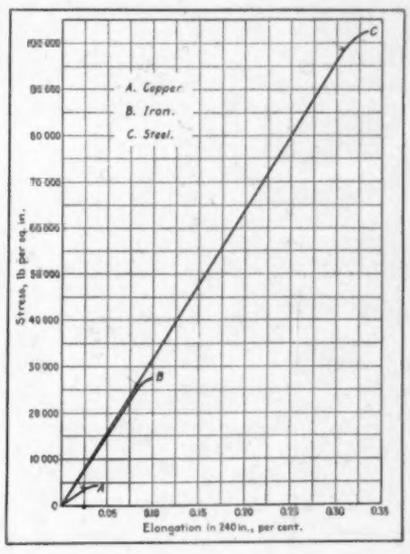


FIG. 9 — STRESS DEFORMATION DIAGRAMS OF ANNEALED COPPER, IRON, AND STEEL WIRE

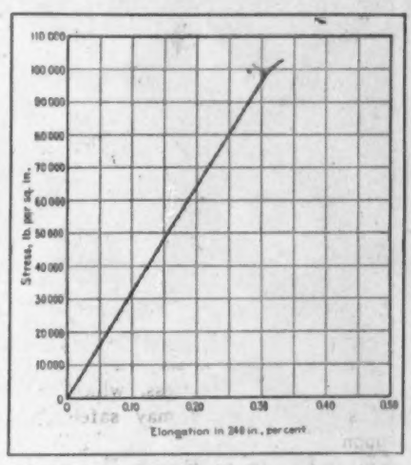


FIG. 10 — STRESS DEFORMATION DIAGRAM OF ANNEALED STEEL WIRE

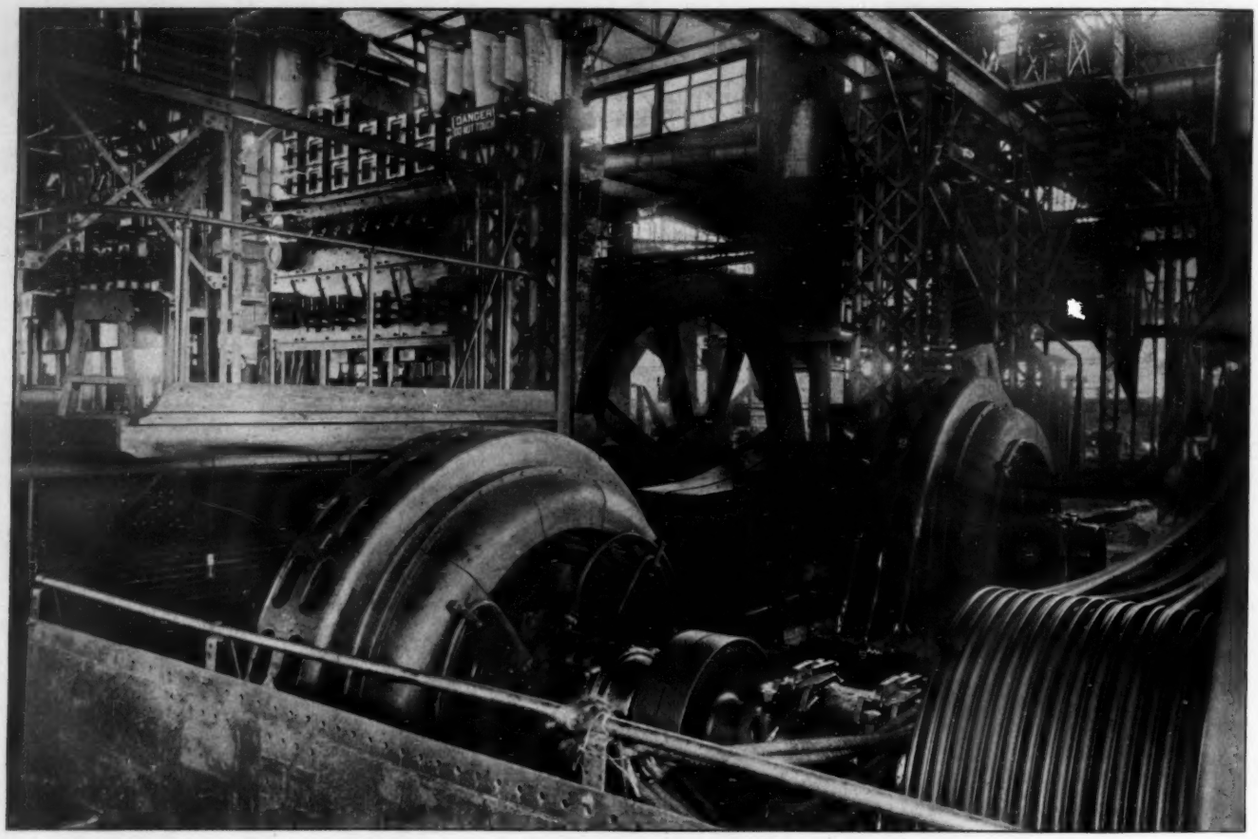


FIG. 1—VIEW OF MOTORS SHOWING SILENT CHAIN AND ROPE DRIVES

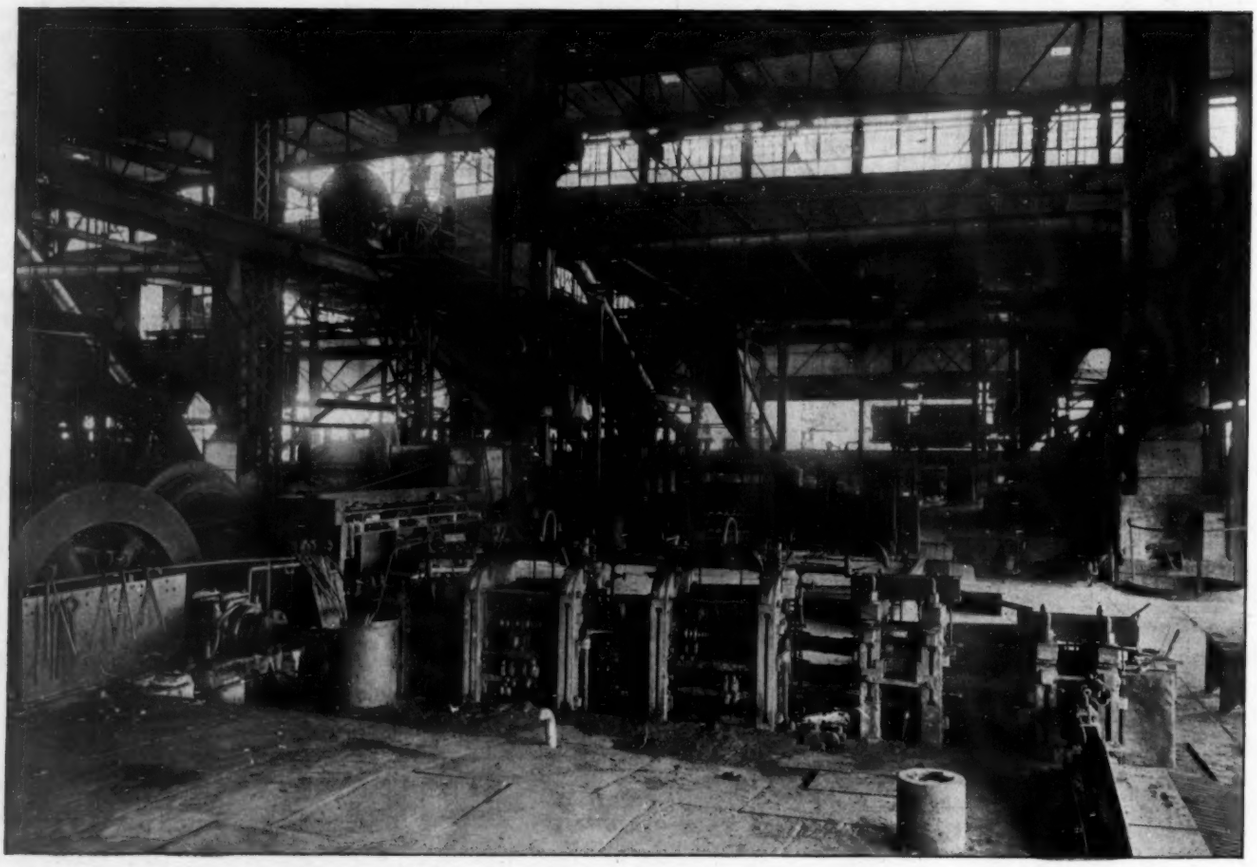


FIG. 2—BELGIAN MILL CONTAINING 9-INCH AND 14-INCH ROLL TRAINS

A Modern Plant for Rolling Iron

Description of Works of St. Louis Screw Co.—Special Provision for Cleaning and Tumbling Scrap—Powdered Coal Used as Fuel

BY H. COLE ESTEP

IN THE past few years such tremendous forward strides have been made in steel mill practice that the fact that equal progress has been made in the bar iron field has been somewhat overshadowed. The business of rolling iron is by no means decadent and iron bars form a large proportion of the total merchant bar production of the United States. In 1913, the latest year for which official figures are available, out of a total production of 3,957,609 tons of merchant bars, the iron mills provided 1,026,632 tons. But to turn out iron bars profitably under present conditions, modern equipment and methods are necessary. As an example of the character of the equipment required for a successful, up-to-date iron mill, the new plant of the St. Louis Screw Co., St. Louis, Mo., affords an unusually interesting study. The design and equipment of this plant is on a par with that of the most modern steel mill, in fact, the plant marks another milestone in the progress of the wrought iron industry—a progress which, in this country, extends back over 160 years.

Among the features which distinguish the new plant of the St. Louis Screw Co., should be mentioned the employment of pulverized coal in the heating furnaces and the utilization of electricity throughout, for main mill drives as well as for auxiliary purposes. The provision for cleaning all of the scrap in a large, portable tumbling mill before it goes into the furnaces is particularly worthy of note, as is the adoption of roller bearings and silent chain drives wherever practicable in order to reduce friction loss. An unusually interesting, complete, overhead traveling crane and mono-rail system also has been provided.

Until the construction of the new mill, the St. Louis Screw Co., confined its efforts to the manufacture of machine screws, bolts and nuts of all kinds. Special screw machine products, bushings, etc., also are turned out in large quantities and an extensive plant has been in operation for a number of years. The new mill, in addition to furnishing raw material to the screw, bolt and nut departments, will also provide a surplus of iron bars and small shapes for the market. Equipment has been provided for rolling rounds and squares up to 3 inches, and flats of the usual commercial sizes up to 8 inches in width. The total output is estimated at 4,500 tons per month. From St. Louis a wide consuming territory is reached by favorable freight rates over 23 railroads and this situation gives to the St. Louis Screw Co.'s new mill a number of advantages from a commercial standpoint.

The new plant is situated at 6800-7000 North Broadway, near the Mississippi river, and about six miles north of the business district. A plot of ground, 12 acres in extent, has been acquired and ample provision has been made for future extensions to the works. The yard is filled to a depth of about 2½ feet. The mill floors are 4 feet above the yard level. The buildings, which were fabricated by the Decatur Bridge Co., Decatur, Ill., are of depressed bay construction, which furnishes ample and uniform light and good ventilation to all portions of the mill floor. The buildings have structural steel frames sheathed with corrugated galvanized siding which, owing to the mild climate, does not extend to the ground. Ample natural ventilation, therefore, is provided and the plant is cool in summer. The present main buildings are arranged in the form of an L and with the bolt and screw buildings to be erected later, will form a complete quadrangle.

The equipment now installed includes an 18-inch bar mill with two 5-door heating furnaces; a 14-inch roughing and a 9-inch finishing train, operated together as a Belgian mill; a tumbling mill and piling bench; a crane and mono-rail system; scrap-handling apparatus; a coal pulverizing plant; a substation; a warehouse, and auxiliary facilities. The Belgian mill is provided with two 4-door heating furnaces.

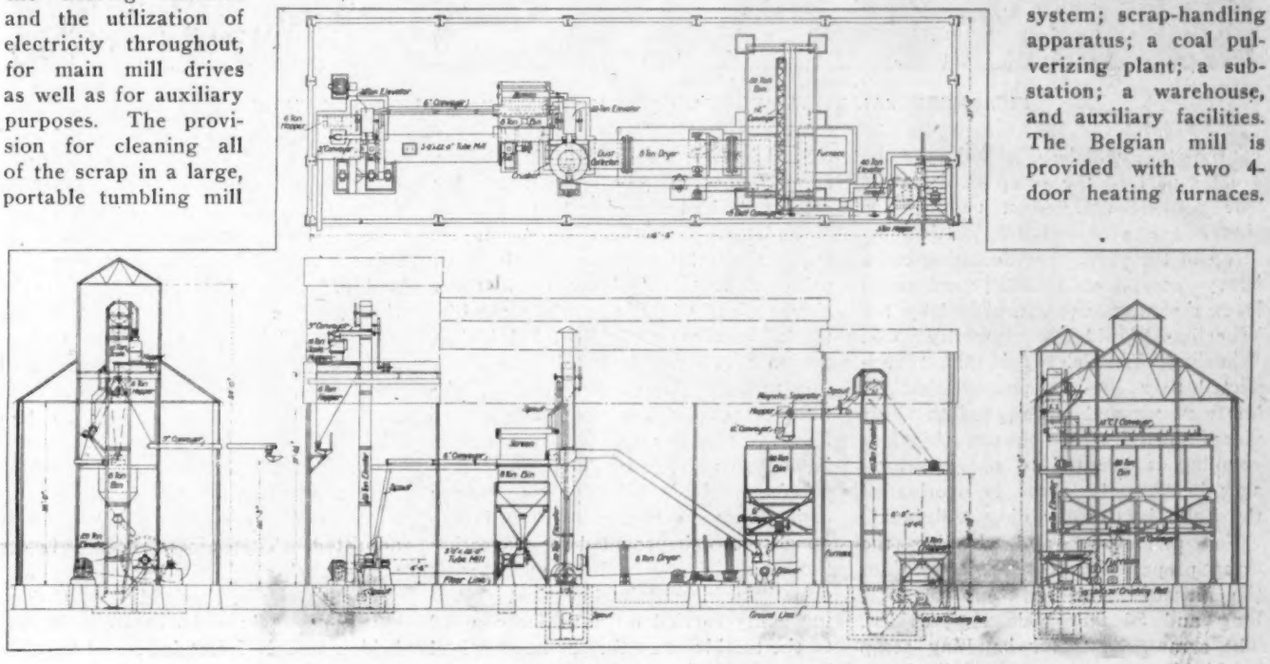


FIG. 3—GENERAL ARRANGEMENT OF COAL PULVERIZING DEPARTMENT

Railroad tracks enter the plant on the east side from the north and south, their general arrangement being shown in Fig. 7. For weighing incoming and outgoing shipments a 150-ton 50-foot Howe track scale has been provided.

Some Equipment Features

The scrap yard, which extends along the east side of the piling and puddle mill building, is 850 feet in length and 120 feet in width. For the present the cars are being switched and the scrap handled by a 15-ton, eight-wheel locomotive crane, furnished by Orton & Steinbrenner Co., Chicago. A 2-yard double line grab bucket and a 52-inch Electric Controller & Mfg. Co. magnet are also used in connection with this crane. Eventually a one-leg gantry crane will be installed over the greater part of the scrap yard. Suitable portable type direct motor-driven shears are provided for cutting up scrap in the yard. For handling extra heavy scrap, a 100,000-pound steel lever shear has been furnished by the Wheeling Mold & Foundry Co., Wheeling, W. Va. It is direct connected to a 100-horsepower Westinghouse motor and is designed to shear pieces up to 5 inches square. A safety coupling is inserted to prevent damage; in case the shear is overloaded the bolts in this coupling will break.

For assembling and cleaning the scrap preparatory to charging it into the furnaces, a piling room 140 feet long and 80 feet wide is provided. The arrangements for handling scrap in this department are unusually interesting. As indicated in Fig. 7, the material is unloaded from cars standing on the track in the scrap yard and discharged into a series of elevated chutes. The rear ends of these chutes are 29 feet from the yard level, the front ends being 19 feet 2 inches from the yard level; the floors of the chutes are inclined 32 degrees from the horizontal. The chutes discharge the scrap directly into the tumbling mill, in which it is thoroughly cleaned before it is piled and made ready for the furnaces. The tumbler removes all of the rust, scale and refuse from the scrap, leaving it in a clean and uniform condition, and it is believed that this will materially improve the quality of the finished product.

The tumbler is mounted on an electrically driven car which runs on an elevated track over the piling bench. It may, therefore, be spotted in front of any desired chute and can also be shifted to deposit the cleaned scrap at any point on the piling bench. The principal features of the tumbler are shown clearly in Fig. 5. The tumbler track has a gage of 6 feet 7⅞ inches, the rails being 7 feet 2 inches above the top of the piling bench. The tumbler proper is 12 feet long and 5 feet in diameter and is designed to handle an average of 30 tons of scrap per hour. It is suitably geared to a 35-horsepower motor. A 10-horsepower motor is provided for traversing the car. The tumbling apparatus is entirely self contained, a dust collector being carried on a trailer coupled to the tumbler car; the car has a wheel base of 15 feet 5½ inches and the trailer a wheel base of 10 feet 4 inches. The speed of the car and trailer is 40 feet per minute. The tumbler is provided with a door opening 36 x 138 inches, sufficiently large to permit easy loading and discharge. A 2-ton electric hoist is provided to handle the door. The entire tumbling apparatus was designed and built by the W. W. Sly Mfg. Co., Cleveland. The piling bench is 140 x 10 feet of steel and concrete construction, the floor consisting of removable plates 5 feet 10 inches long.

Details of Furnaces

For heating the piled scrap, two four-door and two five-door reverberatory furnaces are provided. They are arranged in pairs behind the roll stands as indicated in Fig. 7. A sectional view of one of the five-door furnaces is shown in Fig. 13. This furnace has an overall length of 46 feet with an overall width of 10 feet 9 inches. The hearth is 23½ feet long and 8½ feet wide. The flue at the throat of the furnace is 24 inches wide and 33 inches high to the springing line of the arch. The products of combustion are discharged into a 5-foot brick lined steel stack 70 feet high. The bridge wall is 2 feet 3 inches in thickness and is provided with a checker passage in the center through which air for combustion is admitted. This air is heated in its passage through the chill box and checker work in the bridge wall. The combustion chamber in front of the bridge wall is 5 feet long and 8½ feet wide, with an average height of 5

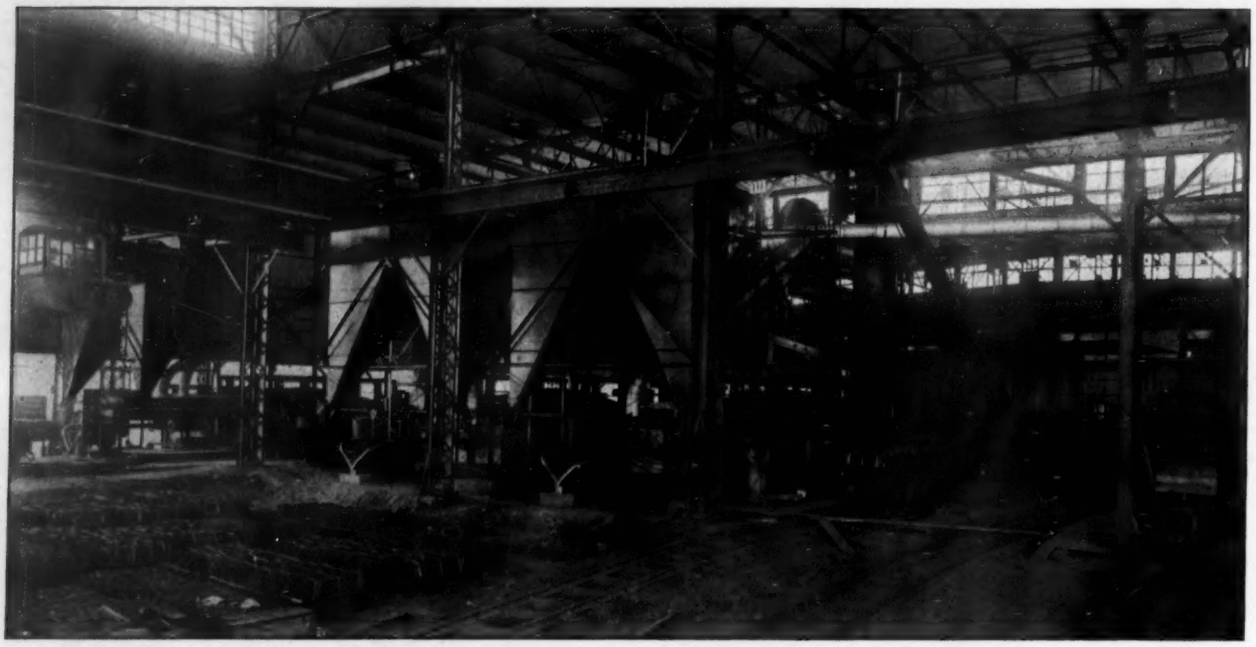


FIG. 4—GENERAL VIEW OF COAL CONVEYOR AND BINS BEHIND FURNACES

feet 4 inches. The furnaces are lined with 1½-inch magnesia block which greatly reduces radiation losses and eliminates the necessity for water shields.

Furnaces Burn Pulverized Coal

As mentioned above, the furnaces are designed to burn pulverized coal, each furnace being provided with two burners, the construction of which is indicated in Fig. 12. The powdered coal is fed to the burners from 8-ton bins located under the conveyor back of the furnaces, as indicated in Fig. 8. Controllers are attached to the bottoms of the discharge spouts of the bins for regulating the flow of the coal. This controller, which is manufactured under the Dunn patents, as shown in Fig. 12, contains a worm which conveys the coal to a point where it is forced through a screen, thus causing it to be fed in a continuous stream instead of in solid masses; this obviates pulsations of flame in the furnace.

An air jet picks up the coal as it falls from the screen and blows it through a small pipe into the burner. The air which passes through the syphon is merely sufficient in volume to carry the coal to the burners and the main volume of air for combustion is provided through the 14-inch burner pipe under a pressure of 1½ ounces per square inch. The quantity of coal delivered to the burner is controlled by means of a variable speed motor, which actuates the screw through gearing and a worm drive. A rheostat for regulating the speed of each controller is provided at a point convenient for the furnace operator. Each burner has a capacity of 900 pounds of coal per hour.

FIG. 6—GENERAL VIEW OF TUMBLER AND PILING BENCH

It is estimated that the coal consumption will be about 600 pounds per ton of iron; in other words, on a basis of 200 tons daily output, the coal consumption will be 60 tons a day. The coal is crushed so that 95 per cent passes through a 100-mesh screen and 85 per cent through a 200-mesh screen. The details of the coal pulverizing plant and conveying system will be given later. The primary air which is admitted to the burners through the injector nozzles is provided by a fan having a capacity of 2,000 cubic feet per minute at 7½ ounces pressure. This fan is driven at 1,420 revolutions per minute by a 7½-horsepower motor. The secondary air is furnished by a Boston blower designed to deliver 30,000 cubic feet per minute. It is provided with a 35-horsepower motor operating at 460 revolutions per minute.

Air Preheating Device

The secondary air is being preheated by passing it through a drum or jacket built around one of the furnace stacks. In this way, some of the heat in the flue gases is reclaimed and transferred to the incoming air and at the same time the stack temperature is not lowered sufficiently to interfere with the draft. An 8-inch jacket 30 feet high has been provided and the air is preheated to about 300 degrees, resulting in an appreciable fuel economy.

The general arrangement of the mills is clearly shown in Fig. 7. With the exception of the silent chain drive, they were furnished complete by the Wheeling Mold & Foundry Co., Wheeling, W. Va. The 18-inch bar mill consists of two three-high and one two-high stands of rolls together with a stand of pinions geared to a 600-horsepower motor through a Morse silent chain. The motor, which was built by the Allis-Chalmers Mfg. Co., Milwaukee, is designed for 3-phase, 2,200-vole, 25-cycle alternating current. It is arranged for two speeds, 300 and 214 revolutions per minute, respectively, with 20 per cent slip under each speed. Full power is delivered at the motor at both speeds. The windings

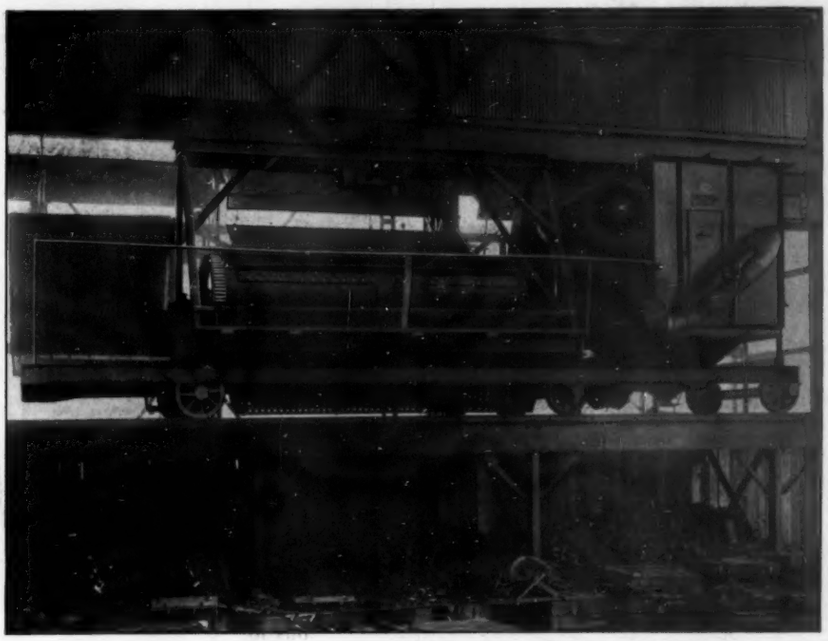


FIG. 5—SPECIALLY DESIGNED 60 x 144-INCH TUMBLER IN WHICH ALL THE SCRAP IS CLEANED

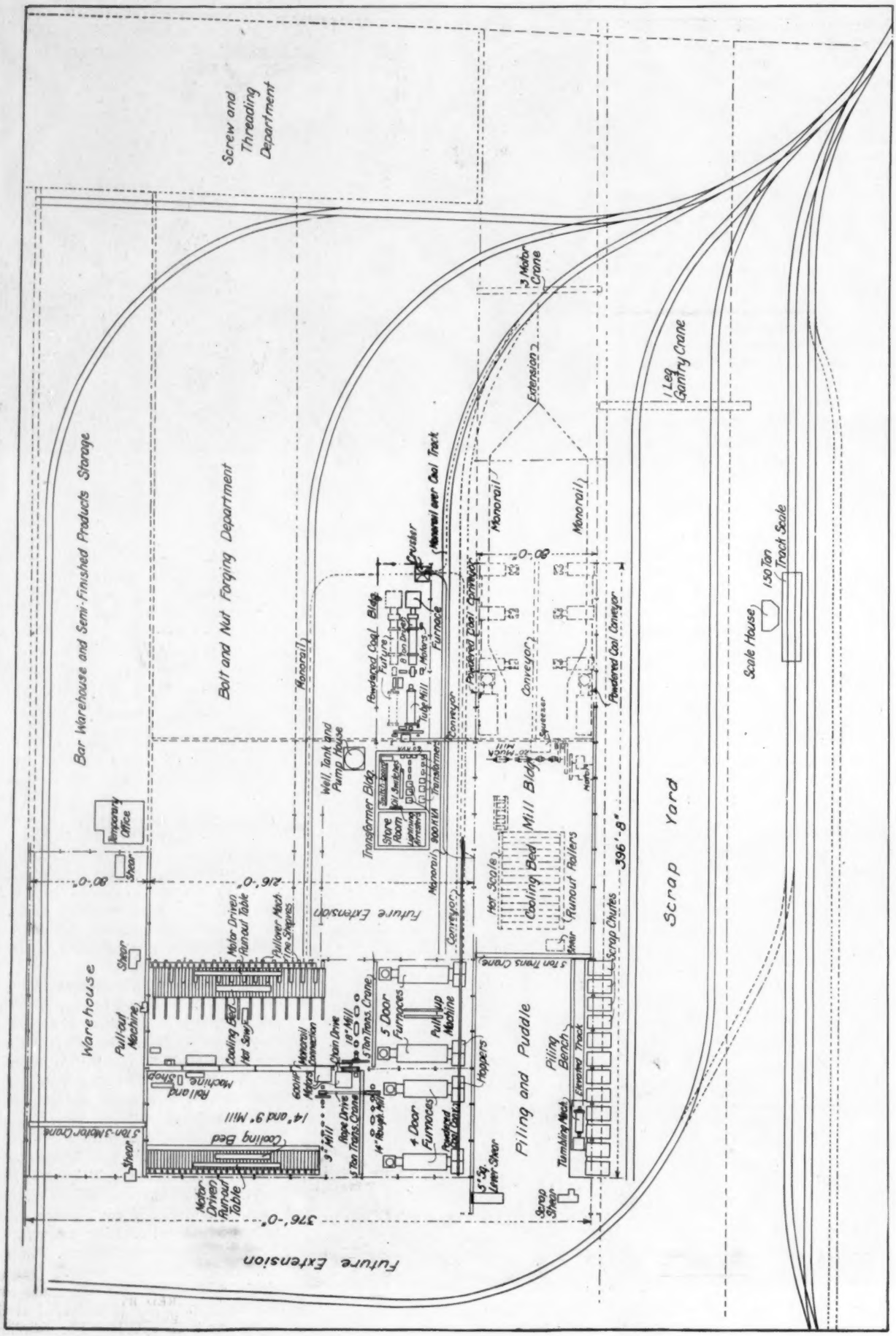


FIG. 7—GENERAL ARRANGEMENT OF NEW PLANT OF ST. LOUIS SCREW CO.

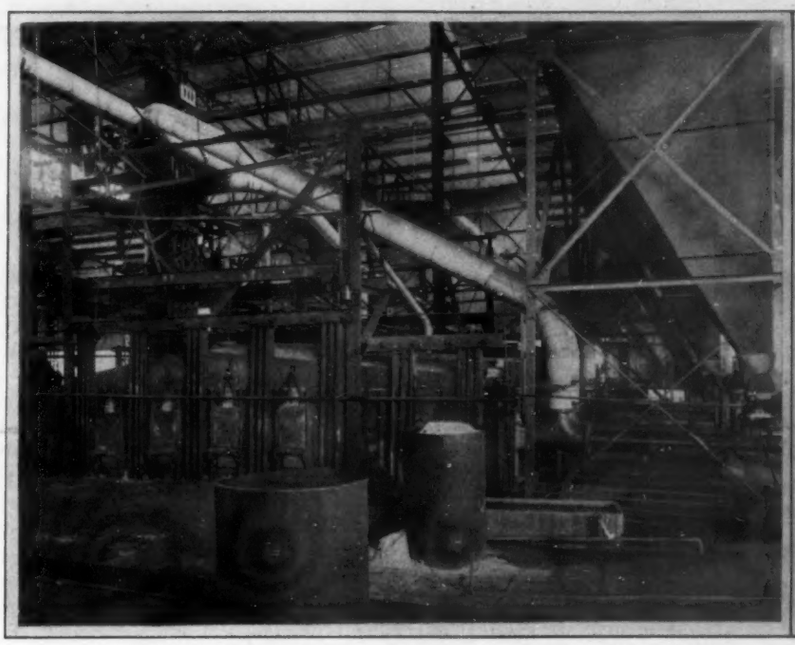


FIG. 8—FOUR DOOR HEATING FURNACE ILLUSTRATING THE COAL FEEDING MECHANISM

FIG. 9—ALL CINDER IS QUENCHED IN WATER, IN SPECIALLY DESIGNED BUCKETS

for both speeds are in the same slot.

The silent chain drive is said to be the largest of its kind now in service. It consists of two strands of 2-inch pitch chain, each 17 inches wide and 152 links long. The driving and driven sprockets have 29 and 79 teeth respectively, the speed ratio, therefore, being 2.72:1. With motor speeds of 300 and 214 revolutions per minute, respectively, the corresponding roll speeds are 110 and 78.5 revolutions per minute. The chain is run at 1,450 feet per minute at the higher speed. The distance between sprocket centers is 101 inches. The pull is estimated at 13,750 pounds, but the breaking strength of the chain is over 250,000 pounds, thus providing a large factor of safety. This transmission is said to be 98 per cent efficient and is designed to stand an overload of 100 per cent; in other words it is claimed it will successfully transmit 1,200 horsepower for short periods of time. At the two speeds, 110 and 78.5 revolutions per minute, respectively, the peripheral speeds of the 18-inch rolls are 518 and 370 feet per minute, respectively.

The 18-inch mill is designed to roll rounds and squares from 1 to 3 inches and flats up to 8 inches in width, although capable of handling flats up to 12 inches. It has an estimated capacity of 2,500 tons per month. The roll housings for this mill are semi-steel castings, with 27-inch windows designed to accommodate rolls with

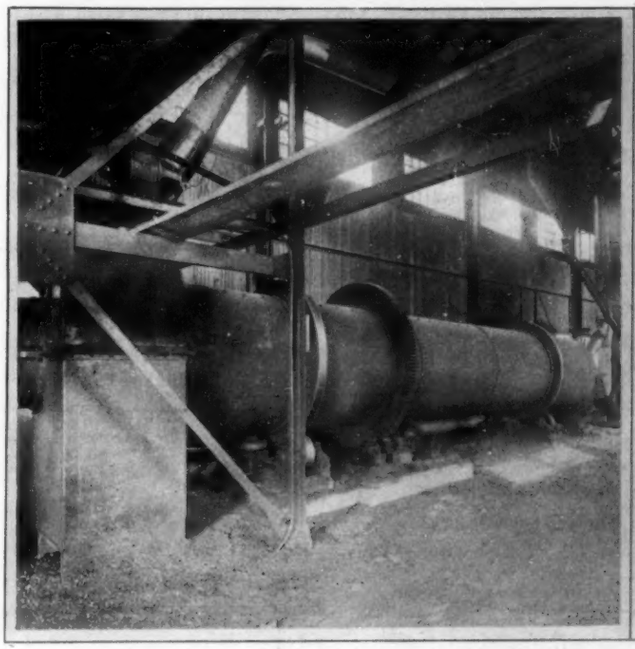


FIG. 10—COAL PULVERIZING DEPARTMENT, SHOWING DRIER, ELEVATORS, BINS, ETC.

FIG. 11—THE RAW COAL IS DELIVERED BY MONO-RAIL AND IS STORED IN AN 80-TON BIN

11-inch necks. The middle roll is stationery, the position of both the upper and lower rolls being controlled by screws. The 18-inch pinion housing also is semi-steel. To regulate the speed of the mill, a 66,000-pound steel fly wheel, 18 feet in diameter, is provided. The cooling bed for the 18-inch mill is 110 feet long and 3 feet in width. It is provided with a mechanical pull-out and pull-over of simple design. The runout table, which was furnished by the Duncan Foundry & Machine Works, Alton, Ill., is equipped with roller bearing rollers spaced 4 feet center to center. The entire table, which contains 27 rollers, is driven by a 5-horsepower motor.

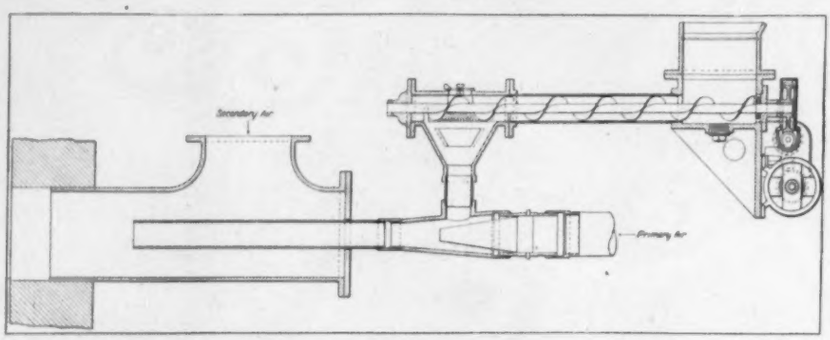


FIG. 12—DETAIL OF POWDERED COAL BURNER

The 9-inch finishing mill, which is operated in conjunction with the 14-inch roughing mill, is designed to roll rounds and squares from ⅜ to 1¼ inches and flats from ⅝ to 4 inches in width. It has an approximate capacity of 2,000 tons per month and was also furnished by the Wheeling Mold & Foundry Co., Wheeling, W. Va. The 14-inch roughing train includes two three-high roll stands and one stand of pinions; the 9-inch finishing train includes two three-high and two two-high stands, together with a stand of pinions. The 9-inch rolls are direct connected to a 600-horsepower Allis-Chalmers motor and the 14-inch train is driven by the same motor through a rope connection. A 30,000-pound 10-foot steel flywheel is provided on the motor shaft. The drive consists of fifteen 1½-inch ropes, a large factor of safety being provided. The driving sheave is 5 feet and the driven sheave 9 feet 10 inches in diameter. The speed of the 14-inch mill, in revolutions per minute, therefore is approximately half that of the 9-inch mill. The motor operates at the same speed as the one driving the 18-inch mill, namely 300 and 214 revolutions per minute. The peripheral speeds of rolls in the 9-inch mill, therefore, are 708 and 505 feet per minute, respectively. The peripheral speeds of the 14-inch rolls are 560 and 400 feet per minute, respectively, at 150 and 107 revolutions per minute. The distance between the two trains of rolls is 33½ feet.

The shoe plate of the 9-inch mill is 28 feet in length. The housings are semi-steel with 12½ inch windows, the mill being designed to accommodate 10-inch rolls. The stationary rolls in the three-high stands are fixed, the top and bottom rolls being adjusted by means of screws. The cooling bed is similar to that provided for the 18-inch mill except that it is only 15 feet in width and is not equipped with a pull-over. The two runout tables are duplicates.

Each main mill motor is provided with a control panel built by the Cutler-Hammer Mfg. Co., Milwaukee. These panels are mounted on a platform which is so situated that the motor operator has a clear view of all three sets of roll stands. The panels are fitted with oil switches for stator and rotor control. Hand operated contactors are provided for slip resistance and speed control. The oil switches are interlocking so as to prevent any danger of throwing the wrong switches together. Each panel is fitted with a voltmeter, and an integrating and curve-drawing watt-meter. A stop button is placed near each train of rolls so that the roller can shut down the motor. The scale from the rolls is sluiced into a centrally located pit from which it is removed by grab buckets.

As indicated in Fig. 7, the two runout tables deliver the finished bars through shears into the bar warehouse, which is 80 feet in width and 210 feet in length. The shears at the end of the 18-inch mill table have sufficient power to cut 3½-inch squares; those at the end of the 9-inch mill table are designed to shear pieces up to 2½ inches square. Both shears, which are motor driven, were furnished by the A. Garrison Foundry Co., Pittsburgh. Suitable cradles and bar pilers are located on the delivery side of the shears. The bar warehouse is served by a 5-ton Northern crane with a span of 77 feet. A track over which material may be shipped out of the plant is laid into the bar warehouse.

The main mill buildings, piling and puddle mill buildings, are served by a series of 5-ton transfer cranes operated in connection with a mono-rail

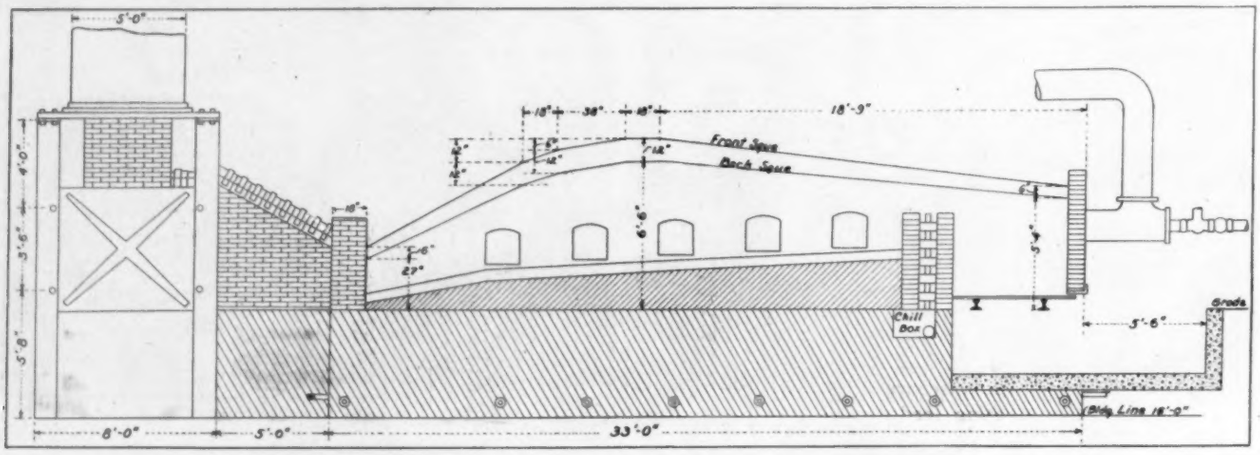


FIG. 13—LONGITUDINAL SECTION OF 5-DOOR HEATING FURNACE

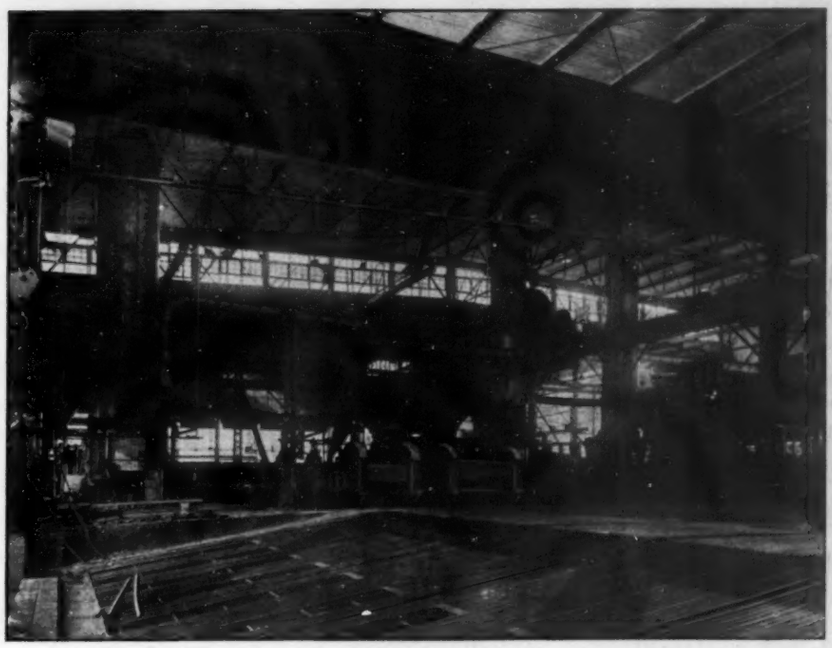


FIG. 14—THE 18-INCH MILL

system furnished by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. Two 5-ton motor driven hoisting units are provided for the mono-rail system, one being cage and the other floor controlled. It may be noted in this connection that scale from the rolls is sluiced into pits at the ends of trains, from which it is removed in drop bottom buckets; also all cinder is run into drop bottom buckets 5 feet in diameter and 5 feet high, filled with water, the cinder being thus granulated and danger of explosions eliminated.

The coal pulverizing plant, which was furnished by the Power & Mining Machinery Co., Cudahy, Wis., is located alongside the future puddle mill building, as indicated in Fig. 7. The coal is received on a track which extends between the pulverizing plant and the puddle mill building, and is unloaded by means of a 1½-yard Hayward grab bucket operated by one of the mono-rail hoists. The mono-rail discharges the coal into the receiving bin of the pulverizing plant.

Extensive Coal Pulverizing Equipment

The general arrangement of the coal pulverizing apparatus is shown in Figs. 3 and 10. The building is 117 feet long and 37 feet wide. The present equipment is designed to handle eight tons of coal per hour. Space, however, is provided for the installation of duplicate units in the future. The receiving hopper, which has a capacity of five tons, discharges the coal onto a reciprocating feeder operated by a chain from the crusher. The feeder delivers the coal directly into the crushing rolls, which are 24 inches in diameter and 30 inches in width. The rolls are provided with spikes of usual construction. One of the rolls is mounted on a spring so that in case any unbreakable substance passes into the crusher, the rolls will not be damaged. This crusher reduces the run of mine coal to cubes not exceeding ¾-inch in size.

The coal is discharged from the spiked roll crusher into the boot of a completely enclosed bucket elevator which has a capacity of 40 tons per hour. The elevator delivers the coal to a belt conveyor which is provided with a magnetic pulley at the discharge end. A 12-inch screw conveyor receives the coal from the belt conveyor and deposits it in an 80-ton storage bin. A 12-inch conveyor is attached to the bottom of the 80-ton bin, the quantity of coal being regulated by means of slides, which may be opened or closed as desired, so that the coal can be drawn from any point in the bin.

The 6-inch conveyor on the bottom of the storage bin delivers the coal to a screw conveyor which in turn discharges it into the rotary driver. The latter, which has a capacity of 8 tons per hour, is supported on two roll stands equipped with adjustable bearings. The drier is so designed that it may either be fired by hand or heated by the products of combustion from the puddling furnaces which are to be installed later. The drier has sufficient slope to force the coal to the discharge end. It is operated by a 20-horsepower motor which runs at 725 revolutions per minute; this motor, through a belt, also drives the blower utilized to exhaust the products of combustion from the drier. It is said that the drier will reduce the moisture content of the coal to less than 1 per cent.

Before being permitted to escape into the atmosphere, the discharge gases from the exhauster are passed through a cyclone separator which takes out the fine particles of coal carried up from the drier.

From the drier, the coal is passed into a Williams mill which crushes it to 20-mesh and finer, about 50 per

(*Continued on page* 108b.)

FIG. 15—BAR STORAGE WAREHOUSE

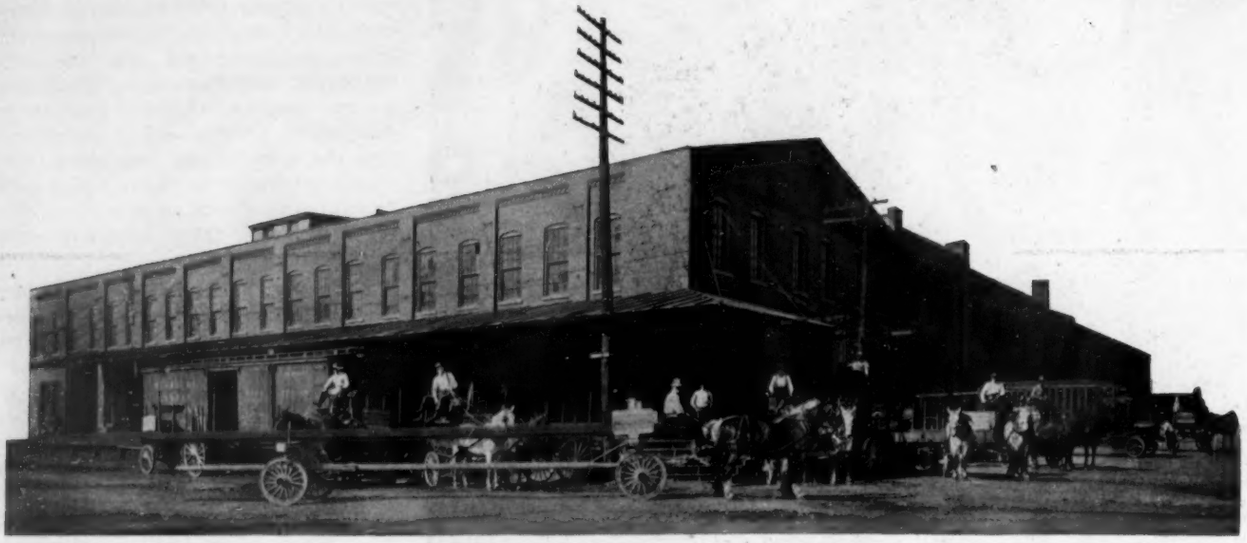


Fig. 1—Exterior of Ryerson-Hagar St. Louis Plant, Showing Shipping Platform Serving Freight Cars, Teams and Motor Trucks

Remodeled Warehouse at St. Louis

Important Extensions Made at Southwestern Plant of Joseph T. Ryerson & Son—Additions to Equipment

THE southwestern business of Joseph T. Ryerson & Son has been important ever since the Ryerson plant in Chicago was first built, and to more effectively provide for the needs of its southwestern customers the Ryerson organization purchased the plant of the W. C. Hagar Iron Co., St. Louis, in July, 1914. A description of the Hagar plant immediately following its absorption by Joseph T. Ryerson & Son was published by *The Iron Trade Review*, Aug. 6, 1914. Since that time the business handled through this branch has increased materially and important extensions recently have been made to the plant.

The Ryerson company has continued to handle the mill, mine and boiler makers' supplies which had been sold throughout the southwest by the Hagar Iron Co. for over 22 years and, in addition, has added its own extensive line of bars, shapes, plates, sheets, rivets, bolts, tubes, specialties, tool steel, machinery, etc. The Ryerson-Hagar St. Louis plant, therefore, is thoroughly equipped to fill orders both for mill supplies and for plain iron and steel products. In maintaining this combination stock an effort is made to completely fill the peculiar needs of the southwestern territory. It is stated that the volume of business handled through the St. Louis plant has increased 300 per cent since the Hagar Iron Co. was taken over by Joseph T. Ryerson & Son. The newer buildings at the St. Louis plant add about 82,000 square feet to the floor space; in other words the size of the plant has practically been doubled. The new structural bay, containing the stock of beams, channels, angles and tees in 60-foot lengths is served by a high speed traveling crane of 10 tons capacity. A Ryerson friction saw designed to cut shapes up to 24 inches has been installed. The steel warehouse, which adjoins the structural section, is 80 x 300 feet. The universal, sheared, tank and flange plates which are carried in this department are stocked in long lengths and all commercial thicknesses. A new 10-ton crane has been provided for transferring plates to wagons or cars at either end of the building. A 96-inch plate shear also has been

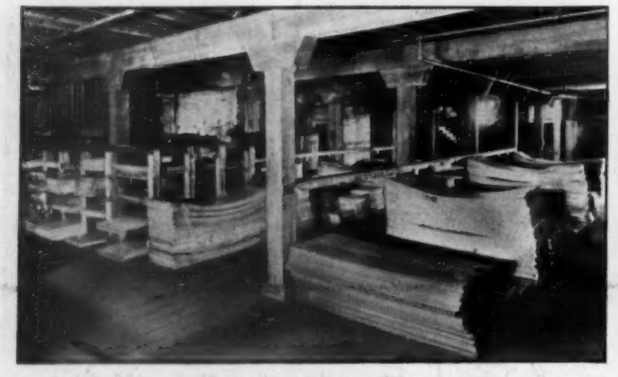


FIG. 2—A PORTION OF THE GALVANIZED AND BLACK SHEET FLOOR

FIG. 3—INTERIOR OF NEW PLATE STORAGE BAY, SHOWING SHEAR IN BACKGROUND

provided for cutting the material to exact sizes. It is expected that in the near future another warehouse will be erected on the north side of the present addition for the purpose of handling an increased stock of bars and miscellaneous materials. A new heavy duty shear has been installed in the sheet storage room. The bar stock has been rearranged and the tonnage materially increased. A well equipped machine shop is maintained for threading pipe, shearing, punching and other miscellaneous work.

The stock of valves, cocks, injectors and other specialties and fittings formerly handled by the Hagar Iron Co., has been very materially increased. An effort is made to maintain a sufficiently large and varied stock so that the buyer may obtain anything that he needs in the way of iron, steel, mill supplies or machinery in one shipment.

The additional buildings for the St. Louis plant were planned by the same engineers who designed the Chicago plant, and with the co-operation of the works manager of the Chicago plant, they were able to incorporate a number of important improvements in the new plans.

Maintain Betterment Department

As described in *The Iron Trade Review*, Jan. 7, 1915, Joseph T. Ryerson & Son maintain a betterment department whose duty it is to continually study the conditions, methods and systems of the organization. During the reconstruction of the St. Louis plant, a member of the betterment department was continually on hand to keep in touch with the construction work and watch for all points which would in any way affect the efficiency of the operation of the plant. He gave particular attention to the location of the driveways and to such subjects as track clearances, possible locations for machinery, etc.

With the advice and co-operation of the man in St. Louis, the betterment department at Chicago made a complete layout of the floor space of the new buildings to scale, showing exactly where each pile of material was to be located as well as the exact location of the machinery, roll tables, skids, driveways, etc.

In executing this plan, care was taken by the department to place material which enjoyed the heaviest demand nearest to the team platform and railroad track, so as to insure the least amount of handling when shipping the greatest amount of material. This of course reduces the time it takes to cut and ship an order. The particular arrangement and location of the new buildings lent itself very readily to this idea, inasmuch as the new structures have railroad facilities at both ends of the spans.

In the development of this plan, continuous comparisons were made of the estimated time in which the material could be handled with the standard times in force at Chicago, to insure at least an equal if not an improved standard of efficiency in shipping and handling material from the St. Louis warehouse. In working out the details, the betterment department enjoyed the co-operation of the management and operating force at Chicago. A thoroughly co-ordinated and practically adjusted system of operating the warehouse business was the result.

The Ryerson-Hagar plant at St. Louis has complete facilities for shipment either by team, motor truck, rail or river. A considerable tonnage is handled by the packet steamers plying the Mississippi and Illinois rivers.

The St. Louis plant is in charge of Austin M. Mueller, for years assistant sales manager of the Ryerson organization at Chicago. The management of the office and mill supply business is in the hands of Harold B. Ressler, also formerly located in Chicago. The credit department at St. Louis is in charge of C. E. Johnson and the city sales department is managed by R. B. Wilson.

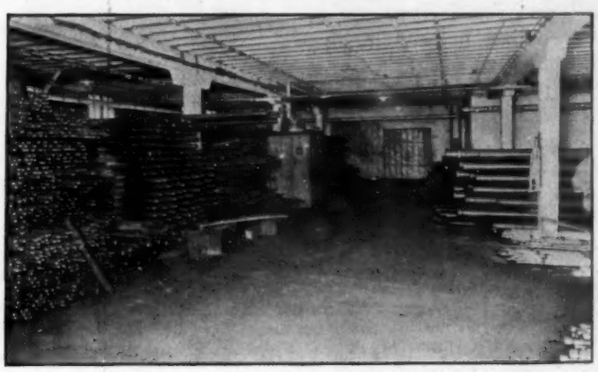


FIG. 4—A CORNER IN THE PIPE STORAGE DEPARTMENT

FIG. 5—A NEW RIVET STOCK HAS BEEN PROVIDED

Book Review

Experiences in Efficiency, by Benj. A. Franklin; 167 pages, cloth; published by the Engineering Magazine Co., and furnished by *The Iron Trade Review* for $1.00.

The author in his preface calls attention to the fact that few ideas are new and that the successful executive usually is not an originator of new ideas as much as an assimilator and adapter, inspired by the experience of others. What is successful in one plant will be successful in another when properly changed and adapted if the basic principles of its operation are understood. The volume under discussion is an effort to place in the hands of an executive seeking specific knowledge a number of actual experiences which may offer inspiration which will result in new methods and better efficiency in production. The demand seems to exist for actual examples of efficiency methods. Many men believe operation in their plants can be bettered but do not know how to bring this about. They may have a fear of getting into deep water in taking up a matter on which they are not fully informed and in this volume they are offered an opportunity to profit by the examples of others who have been successful.

An important emphasis is placed upon the fundamental necessity of "efficiency will" as a force in establishing efficiency practice. While the volume does not present diagrams and forms or set rules it does discuss the fundamentals and present numerous instances where these principles have been applied so as to reduce waste and obtain a larger percentage of production from the equipment, both mechanical and human, that is at the disposal of the factory executive.

When drilling in automatic machines, where the holes are not over twice the diameter of the drill, use high speed and light feed, flooding the drills with oil.

The Effects of Quenching Mediums

A Study of the Internal Stresses Produced in Steels of Various Composition by Experiments With Water and Oil Cooling

BY H. V. WILLE

THE exact nature of the changes which take place within the critical range, or at the three transformation points of steel, is still a subject of discussion, but it is a matter of common knowledge that such changes are so profound that all of the physical properties are affected. Within this range steel undergoes loss of the property of magnetism, a pronounced evolution of heat, a distinct change in the rate of increase in electric conductivity, and a curious and abrupt change in linear dimensions. Its tensile strength no longer falls with an increase in temperature, but suddenly increases.

These changes all take place at approximately the same temperature, in grades of steel with sufficient carbon to warrant quenching them for the purpose of improving their tensile strength and elongation. The coincidence of such changes in properties is almost perfect at the critical temperature of an eutectic steel.

These phenomena have been the subject of investigation and study by eminent physicists. The micro-structure of steel of different compositions, quenched at the critical temperature, has also been the subject of much research, it now being possible for a trained metallographist to predict in general terms and with reasonable

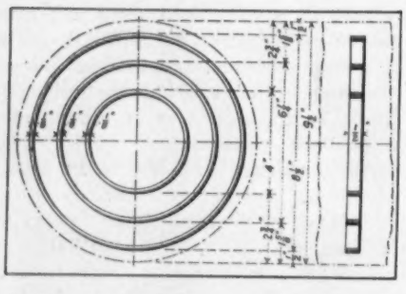


FIG. 1—LOCATION OF THREE STRESS DEFORMATION RINGS CUT FROM FORGING

accuracy, the microstructure of steel of different carbon contents, provided the specimens are small and the quenching is sufficiently rapid to retain the molecular structure induced by heating to the critical temperature.

The effect of quenching and annealing on the tensile strength, elongation and reduction of area of different grades of steel, is also well understood, a large mass of data being available, giving the tensile properties for various quenching conditions.

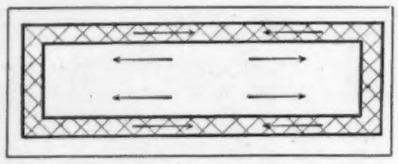


FIG. 2—STRESSES IN A QUENCHED CYLINDER

Both the microstructure and the tensile strength, however, are affected by the rate of cooling, and this is in turn governed by the cooling power of the quenching medium and the mass of the quenched objects. The surface of the latter may also influence these properties. Benedicts' experiments, however, indicate that the surface has little influence.

The classical work of Benedicts, "Experimental Research on the Cooling Power of Liquids and on Quenching Velocities," demonstrates that the quenching power of a liquid depends largely on the latent heat of vaporization, refuting the views, commonly held, that it depends upon the initial temperature or the heat conductivity of the medium. The addition of salt to increase the quenching power of water is also proved fallacious, and the experiments of Le Chatelier indicating that heat conductivity is no measure of the cooling power of a liquid, are confirmed.

Mercury has a heat conductivity of more than ten times that of water, but both of these able physicists demonstrate that it is decidedly weaker as a cooling medium. Le Chatelier considers that the specific heat of the cooling medium governs the cooling speed,—and this is confirmed by Benedicts,—providing the temperature of the body is low, but that the latent heat of vaporization is the controlling factor when the temperature of the body is high. This theory is tenable, considering the large amount of heat which can be carried off by a relatively small weight of vapor, and accounts for the efficiency of water as a quenching medium. Water is the oldest known cooling medium for quenching steel. Subsequently, various animal and vegetable oils were employed, and many of the artisans using them are still under the belief that carbon is added to the steel by these liquids and the properties of the steel thereby improved. In this country mineral oil, because of its low cost, has almost entirely displaced the animal and vegetable oils, and for many years was used almost exclusively for quenching spring plates and large objects.

Water, however, possesses manifest advantages of cheapness, cleanliness, freedom from odor, freedom from fire hazard, and above all, efficiency. It is true that a higher elastic limit, tensile strength and elastic ratio for a corresponding elongation and reduction of area, or a higher reduction of area and elongation for a corresponding elastic limit, can be obtained on a water quenched steel than can be secured by the methods of oil quenching generally practiced. Opposing these manifest advantages is the danger from fractures as the result of lag in the temperature of the steel. Table I shows the fiber stress induced by the difference in temperatures between the inside and outside of a heated piece of steel, subjected to rapid cooling.

These figures were so startling that

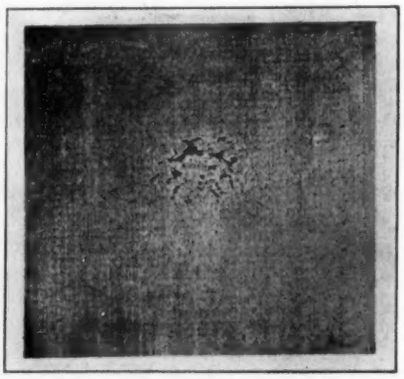


FIG. 3—SECTION OF SEGREGATED BLOOM

several years ago the author made a number of experiments to determine the internal stresses in oil and water-quenched forgings of diameters from 6 to 12 inches. In recent years many different grades of oil have been proposed as being more effective than the high flash-test mineral oil generally employed, and which could be used without danger of producing a

A paper read at the eighteenth annual meeting of the American Society for Testing Materials, at Atlantic City, June 22-26, 1915.

fracture in the steel, and the experiments were extended to include such oils. Full size specimens, 9½ inches in diameter, cut from a driving axle, were employed, and a conservative method of cooling was followed, such as is used in practice, since it was not the intention to determine the maximum stress obtainable, but simply the stresses which would result under usual commercial conditions of quenching. The following quenching mediums in addition to water were employed:

Light Tempering Oil.

Specific gravity, Beaume..... 30.9
Flash point, deg. Fahr..... 400
Fire test, deg. Fahr..... 445
Viscosity, deg. Fahr...112 seconds at 100

Heavy Tempering Oil.

Specific gravity, Beaume..... 25.6
Flash point, deg. Fahr..... 550
Fire test, deg. Fahr..... 625
Viscosity, deg. Fahr...178 seconds at 212

Fish Oil.

Specific gravity, Beaume..... 23.3
Flash point, deg. Fahr..... 405
Fire test, deg. Fahr..... 440
Viscosity, deg. Fahr..165 seconds at 100

Cottonseed Oil.

Specific gravity, Beaume..... 22.6
Flash point, deg. Fahr..... 580
Fire test, deg. Fahr..... 630
Viscosity, deg. Fahr..160 seconds at 100

The forgings were heated to 1,550 degrees Fahr. and quenched in the foregoing mediums at initial temperatures of 70, 150, 212, 300 and 400 degrees Fahr. Observations were made of the rise of the temperature of the quenching medium and of the time of immersion required to cool the forgings to 600 degrees Fahr.

A series of three rings was then cut from each section, as shown in Fig. 1. These rings were accurately micrometered before they were detached and were again accurately measured after detachment from the forging and the fiber stress calculated from the deformation of the rings. From Fig. 1 it will be noted that ½-inch of metal was first removed, so that the first ring represents the fiber stress ½-inch from the surface of the forging, the second ring gives the result 1⅝ inches from the surface and the third ring 2¾ inches from the surface. The detached ring in all cases increased in diameter, showing that ½-inch under the surface the fibers were stressed in compression.

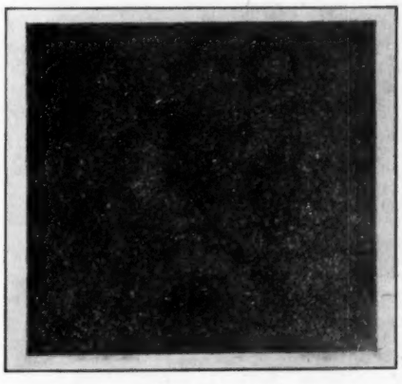


FIG. 4—SECTION OF FORGING MADE FROM BLOOM SHOWN IN FIG. 3 AND QUENCHED IN WATER

Table I.

FIBER STRESS DUE TO RAPID COOLING

Difference of Temp., deg. Fahr.	Fiber stress, lb. per sq. in.
1,500	270,000
1,000	180,000
500	90,000
100	18,000

The explanation is simple. If a cylindrical object is heated to 1,500 degrees Fahr. and suddenly quenched in some cooling medium, the surface contracts so that the outer fibers are in tension and the inner fibers in compression.

This action is shown clearly in Fig. 2, the outside or cross-hatched portion shrinking on the interior portion, so that the outside is in tension and the inside in compression. It is interesting to note that the volume of all the cylinders was decreased by quenching. The fiber stresses induced by the different quenching mediums are given in Table II.

Table II shows that the lowest fiber stresses are induced by the heavy tempering oil quite generally used, and that these stresses are never above the elastic limit of the material. The greatest fiber stresses are induced by water, the immersion temperature appearing to have but little influence in ameliorating the internal stresses. It must also be remembered that the pieces were not rapidly cooled in the water, and that they were withdrawn when they attained a temperature of about 600 degrees Fahr., so that the stresses were reduced by slow cooling from this temperature.

Stresses which are equal to the calculated stresses given in Table I can be produced by water quenching simply by increasing the rate of cooling. It would be unsafe to increase these stresses beyond those produced in the water-quenched specimens, notwithstanding the fact that the tensile properties would be increased thereby.

In order to determine the advantages resulting from rapid cooling, test bars were cut from each one of the specimens, and tested, first, without any annealing and second, after drawing to 1,150 degrees Fahr. The results of these tests are shown in Table III. The analysis of the steel is as follows:

	Per cent.
Carbon	0.41
Manganese	0.55
Phosphorus	0.036
Sulphur	0.024
Silicon	0.023

It would have been possible to secure tensile properties superior to those obtained, by merely increasing the quenching speed. This is particularly true of the water-quenched specimen, but a more rapid rate of quenching was not followed, in order to insure against the development of a crack in any of the specimens.

These internal strains are the primary cause of internal fractures, and their magnitude is clearly dependent on the rate of cooling, but they are aggravated by segregation of impurities or inequalities in the structure of the steel. Fig. 3 shows a section of such a segregated bloom, and Fig. 4 a section of a forging made from this bloom and then quenched in water. A forging made from a perfect bloom can be fractured, if the rate of cooling is sufficiently rapid. An instance of this kind is shown in Fig. 5. A test specimen cut from the forging showed the following tensile properties:

Elastic limit, pounds per square inch.. 57,440
Tensile strength, pounds per square inch 91,660
Elongation in 2 inches, per cent..... 2.80
Reduction of area, per cent..... 6.07

The chemical composition of this forging was as follows:

	Per cent.
Carbon	0.53
Manganese	0.43
Phosphorus	0.034
Sulphur	0.018
Silicon	0.01
Chromium	None
Vanadium	None
Nickel	None

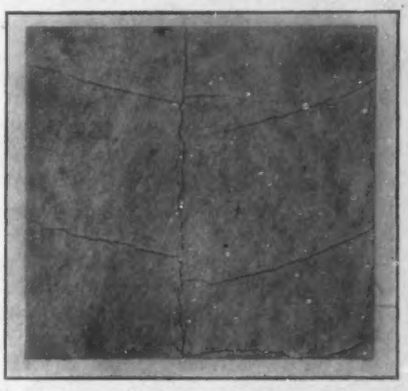


FIG. 5—SECTION THROUGH FRACTURED FORGING MADE FROM PERFECT BLOOM

The rate of cooling also depends upon the chemical composition of the steel, and Dr. Benedicts' experiments show that a high silicon steel has a very much lower rate of cooling than the usual grade of low silicon steels. It has been observed that the high silicon steels are more amenable to

Table II.

FIBER STRESSES INDUCED BY DIFFERENT QUENCHING MEDIUMS.

Quenched in Water.

Temperature of medium, deg. Fahr.			Fiber stress, pounds per square inch, at distance from surface of		
Before quenching.	After quenching.	Time of immersion, minutes.	½-inch.	1⅝-inch.	2¾-inch.
70	210	13	42,600	29,500	16,500
150	boiling.	22	46,800	15,300	8,100
212	boiling.	22	40,200	51,000	15,700
		Quenched in Light Tempering Oil.			
70	330	12	42,300	16,800	4,500
150	374	21	40,500	10,800	2,800
212	435	22	17,650	15,300	4,600
300	410	28	12,890	12,990	6,000
400	fire	23	18,330	16,200	.....
		Quenched in Heavy Tempering Oil.			
70	330	12	24,000	5,100	6,250
150	405	22	23,500	16,200	10,500
212	400	22	17,400	12,600	750
300	445	30	24,000	22,500	11,600
400	460	30	2,460	.....	9,750
		Quenched in Fish Oil.			
70	334	12	39,200	26,100	15,000
150	389	20	23,500	16,200	10,500
212	440	21	27,900	9,090	11,250
300	430	25	30,600	13,980	15,100
400	428	30	29,100	10,560	21,750
		Quenched in Cottonseed Oil.			
70	338	12	30,300	17,700	12,900
150	375	18	25,410	4,200	15,600
212	440	22	26,800	11,100	15,000
300	440	25	19,840	18,240	18,600
400	448	25	16,230	12,480	.....

water quenching than low silicon steels, but this has been attributed to the fact that such steels are generally denser, more uniform and more free from segregation than the low silicon steels. These properties no doubt influence the superior results obtained by water quenching this grade of steels, but the primary cause must be sought in the fact that such steels have a lower rate of cooling, the internal stresses being, therefore, less than in similarly quenched low silicon steels.

The results of these experiments indicate that the tensile properties of water-quenched steel are superior to those obtained by quenching in any other of the usual quenching mediums; and that the internal stresses induced in a water-quenched object are of much greater magnitude than those developed by quenching in any other of the usual quenching mediums. They confirm the laboratory experiments of Dr. Benedicts, that the efficiency of the quenching mediums is not dependent to a marked extent on the initial temperature of the cooling mediums.

They also indicate that with but few exceptions, which can no doubt be explained by some inequality in the steel, the induced internal stresses are affected by the initial temperature, except in case of water; also that internal stresses induced by quenching in water are independent of the initial temperature. It further appears that the small difference between the temperature of the cooling mediums, before and after quenching, confirms Dr. Benedicts' explanation that large quantities of heat are carried off by the latent heat of vaporization. Finally, it seems that light oils have a greater quenching speed than heavy oils but not markedly so. A good tempering oil, however, should be free from tar and should not become thick from the precipitation of the burnt tar.

The Black Products Co., Chicago, manufacturer of core compounds, announces it has established grinding and manufacturing plants at Youngstown, O., and St. Louis. These additional facilities, coupled with the production from its Chicago plant, insures excellent service to the entire foundry trade.

The "knocker" or the man who is always "agin it" whether it be a safety plan or an efficiency step, is a dangerous man to all his fellow workmen. He has no right in any organization and will not stay there.

Table III.

PROPERTIES OF TEST BARS CUT FROM SPECIMENS, QUENCHED IN DIFFERENT MEDIUMS.

Quenched in Water.

Temperature of medium, deg. Fahr.		Time of	Elastic Limit lb. per sq. in.		Tensile strength, lb. per sq. in.		Elongation in 2 in., per cent.		Reduction of area, per cent.	
Before quenching.	After quenching.	immersion, min.	Annealed.	Unannealed.	Annealed.	Unannealed.	Annealed.	Unannealed.	Annealed.	Unannealed.
70	210	13	55,560	70,440	95,960	105,400	23.0	16.0	41.9	30.0
150	boiling	22	55,940	68,160	90,600	100,500	25.0	20.0	46.5	35.8
212	boiling	20	56,160	69,730	102,650	107,850	23.0	19.0	47.3	25.5
		Aver.	55,900	69,443	96,400	104,583	24.0	18.3	45.2	30.4
			Quenched in Light Tempering Oil.							
70	330	12	52,550	58,130	87,750	89,160	29.0	25.0	50.5	45.8
150	374	21	53,760	64,000	92,460	97,500	23.0	19.0	43.7	38.0
212	435	22	59,710	57,000	98,060	103,000	21.0	16.0	36.4	26.0
300	410	28	54,540	64,680	98,480	101,500	24.0	20.0	38.4	33.3
400	on fire	23	55,280	71,000	89,460	100,000	26.0	20.0	48.2	34.0
		Aver.	55,200	62,962	95,200	98,232	24.6	20.1	43.6	35.4
			Quenched in Heavy Tempering Oil.							
70	330	12	53,330	55,340	82,240	91,380	31.0	25.0	53.8	44.7
150	405	22	55,820	63,080	91,050	99,480	21.0	18.0	42.0	28.2
212	400	22	54,820	63,160	90,360	94,260	26.0	21.0	44.7	36.8
300	445	30	55,380	69,560	99,480	99,040	22.0	20.0	37.9	34.8
400	460	30	52,000	59,610	89,000	91,640	25.0	23.0	42.0	39.9
		Aver.	53,300	62,150	90,400	95,160	25.0	21.4	44.3	36.8
			Quenched in Fish Oil.							
70	334	12	57,490	64,500	93,240	100,000	25.0	21.0	46.9	38.0
150	389	20	53,300	67,180	91,380	103,600	25.0	17.0	44.7	29.2
212	440	21	53,840	67,840	90,790	103,000	24.0	19.0	44.1	31.7
300	430	25	57,480	63,060	91,790	95,080	24.0	23.0	43.0	40.4
400	428	30	63,960	67,500	103,500	107,500	17.0	15.0	27.9	22.7
		Aver.	52,100	60,710	92,800	97,512	23.6	20.6	42.8	34.3
			Quenched in Cottonseed Oil.							
70	338	12	54,550	62,500	92,930	97,500	23.0	21.0	44.4	37.0
150	375	18	49,490	54,460	86,890	91,090	26.0	22.0	48.0	35.2
212	440	22	49,040	56,220	89,420	94,520	24.0	22.0	43.7	38.8
300	440	25	57,000	67,000	99,500	102,950	22.0	19.0	39.1	31.5
400	448	25	52,600	63,370	95,740	101,500	22.0	19.0	38.9	29.2
		Aver.	52,100	60,710	92,800	97,512	23.6	20.6	42.8	34.3

Ford Plans for a Fleet

Has Conference With Wm. Livingstone—Pleased by a Visit from President Jas. A. Farrell

Detroit, July 6.—Henry Ford, motor car manufacturer and a capitalist who intends entering the blast furnace and tractor field, has given a further announcement of his plans regarding the construction of extensive furnaces, ore docks and factories for the production of the Ford tractor between Oakwood and Dearborn, in the western portion of the city.

Says Mr. Ford: "We expect, in time, to have our own fleet of boats to carry ore and to transport machines through the Welland canal and to foreign ports. I do not know, as yet, how large this fleet will be. I have conferred with William Livingstone, president of the Lake Carriers' Association, over the possibility of widening the Rouge river for the navigation of big ships.

"I hope and expect to see a model village grow up around the factories I propose building. The $5-a-day wage plan which is in effect at the Highland Park motor factory will hold good through the new establishment and after the company has taken over what land it will need, the remainder will be portioned off to employes at the amount which it cost us.

"Every lot sold will be large enough for a dwelling and a garden place. I do not believe in tenements or cramped cottages. I want my men to have plenty of room, inside and outside their houses.

"I am much interested in the plan of widening the Welland canal. I believe that is soon to be done—or should be. Then ocean going boats may go to France, England, Germany—any place we serve and carry our products without unloading.

"We also plan to erect a tire factory in the Rouge district in which we will manufacture our own tires for Ford cars. I do not believe, though, that the tractor factory will be running before another year. I cannot make any forecast as to how many we will sell each season. One thing we had to overcome was the developing of a light engine for use in the tractors. This we have accomplished. I am inclined to believe, as my experts have told me, that there will be a greater demand for Ford tractors than for Ford cars.

"So far as the manufacture of motor cars is concerned, we are doing even better than we did last year. We set our mark at 300,000 for 12 months, and as 11 months have passed and we are within a few thousand of the set total, I am confident we will exceed expectations by several thousands."

Mr. Ford was much pleased this week by the visit paid him by James A. Farrell, president of the Steel Corporation. Mr. Farrell was shown through the Ford plant at Highland Park.

Bond Issue

Approved by Wheeling Steel & Iron Co.,—Improvements Planned

Stockholders of the Wheeling Steel & Iron Co., Wheeling, West Va., have unanimously approved the authorization of $5,000,000 in bonds, one-half to cover the cost of proposed extensions to finishing mills, principally in the tube mills at Benwood and the tin plate department at Yorkville, O., and the balance to be held as a reserve fund.

In adopting the bond issue, the stockholders provided for the following three things, namely:

"(a) To construct at Benwood a combination sheet, bar and skelp mill, on which both skelp for the company's use at Benwood, and the necessary bars for use at Yorkville would be manufactured.

"(b) To remodel in part, and enlarge the tube mill so as to increase the output of this department by about 20,000 tons per annum.

"(c) To enlarge the tin plate department at Yorkville to a point that would permit of its using the remainder of the output of the steel works.

"The statement further said that with these recommendations perfected, it would allow the company to finish in its own plants the entire output of the steel works. Furthermore, that the board was assured that $2,500,000 of the bonds could be underwritten at this time, which would allow for the suggested improvements and the payment of the company's present indebtedness, both bonded and floating. The unsold portion of the issue would be retained for the future use of the company."

The Wheeling Steel & Iron Co. was incorporated in 1892 with a capital stock of $5,000,000. This capitalization was increased to $7,500,000 on July 17, 1914, by vote of stockholders, enabling the company to purchase the Wheeling Sheet & Tin Plate Co. The latter company owned a six-mill plant on the Ohio side of the Ohio river, not far distant from Wheeling, going into the open market for its raw material. Its consolidation with the Steel & Iron company gave that company an outlet for its surplus steel.

Of the capital stock increase of $2,500,000, made last July, making 25,000 additional shares, 12,000 were used in exchanging for the Sheet & Tin Plate property, and the remaining 13,000 were to be offered to stockholders at par, the proceeds to provide funds for improvements.

Aside from the Sheet & Tin Plate property, the Steel & Iron company owns three blast furnaces, two at Wheeling and one at Martins Ferry; rolling mills and steel works at Wheeling and Benwood, containing cut nail machines, spike machines, skelp mills, puddling furnaces, iron and steel sheet mills, billet and blooming mills; a general gray iron foundry; two butt weld furnaces; a galvanizing plant, etc., and has an interest in several other proceedings.

When the companies merged, C. R. Hubbard, formerly president and general manager of the Steel company, became chairman; Isaac M. Scott, formerly president of the Sheet & Tin Plate company, became president of the Wheeling Steel & Iron Co. The directorate of the company was increased from nine to 13 members.

Alton Steel Co. Property Sold

The property of the Alton Steel Co., Alton, Ill., was sold at public sale to H. C. Fownes, of Pittsburgh, June 29. Mr. Fownes was the only person to bid, his bid being $350,000 above the first mortgage bonds held on the property, which amount to $300,000. The plant of the company, a $1,250,000 corporation, was opened a year ago for the manufacture of hoops, bands and cotton ties. The late T. S. Clark, of Erie, Pa., was president of the company. The plant will resume work at an early date.

New Wage Scale

Bi-monthly examination of the bar iron sales sheets of the Republic Iron & Steel Co., and the Western Bar Iron Association at Youngstown, O., July 10, will be the first for this year under the 1915-1916 wage scale. The new agreement retains the benefits granted puddlers and bar mill workers in times of a good market. The same plan adopted in the spring will be continued in the sheet and tin plate division.

Fig. 1—View in One of the Machine Shops

FIG. 2—NEW WORKS OFFICE

Open New Crane Works

THE NEW plant of the Crane Co., Chicago, commenced operations on July 1 when the nipple department was removed from its old location at Canal and Twelfth streets. Rapid progress is being made in completing and equipping the rest of the buildings and it is expected that within the next three months more than half of the manufacturing departments of the company will be housed in the new Corwith works. This plant is the largest of its kind in the country. The officials decided upon the construction of the Corwith works several years ago, in order to overcome the difficulties encountered in carrying on manufacturing operations at several widely scattered points throughout the city. As shown in Fig. 5, the company has five works located in different sections of Chicago. Maximum efficiency was impossible under these conditions, as it was frequently necessary to transport semi-finished material a distance of several miles from one shop to another for the final finishing operations.

Two years ago, the Crane Co. purchased 160 acres of land on Kedzie avenue between Thirty-ninth and Forty-third streets and began the construction of a plant which ultimately will comprise 49 buildings. As shown in Fig. 3, 27 of these buildings already have been constructed. The various departments of the company will be consolidated in the new plant as rapidly as the buildings are completed but it is expected that several years will elapse before the company's entire manufacturing organization is located in the new works.

The plant provides for the continuous progression of the work from the raw material storehouses to the shipping platforms. Numerous railroad switches permit the rapid handling of both incoming and outgoing shipments. The receiving and storage building for raw materials for the cast iron and malleable foundries, located at the extreme north end of the works, adjoins the foundries at right angles. The raw materials pass through the foundry in practically a

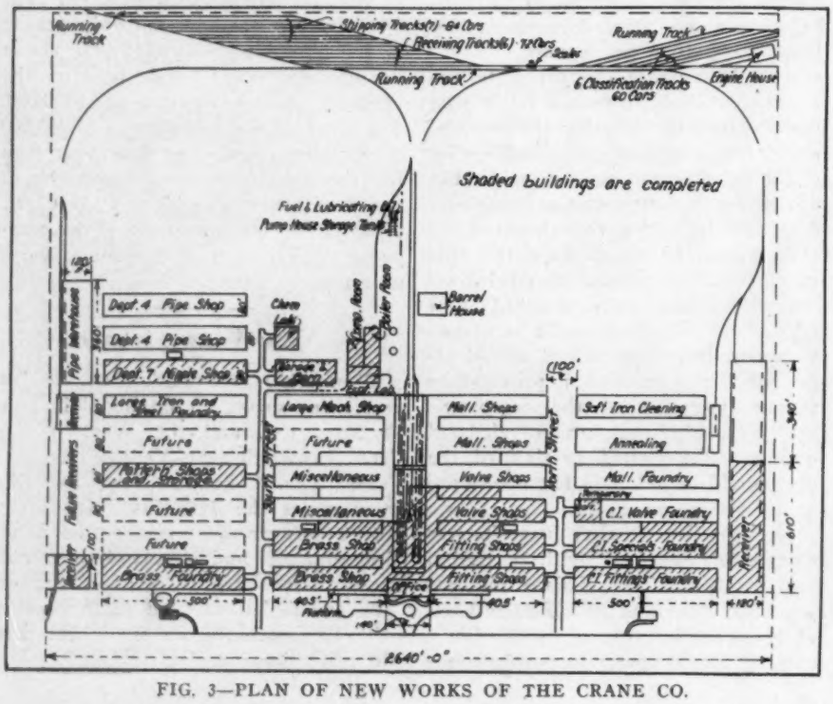


FIG. 3—PLAN OF NEW WORKS OF THE CRANE CO.

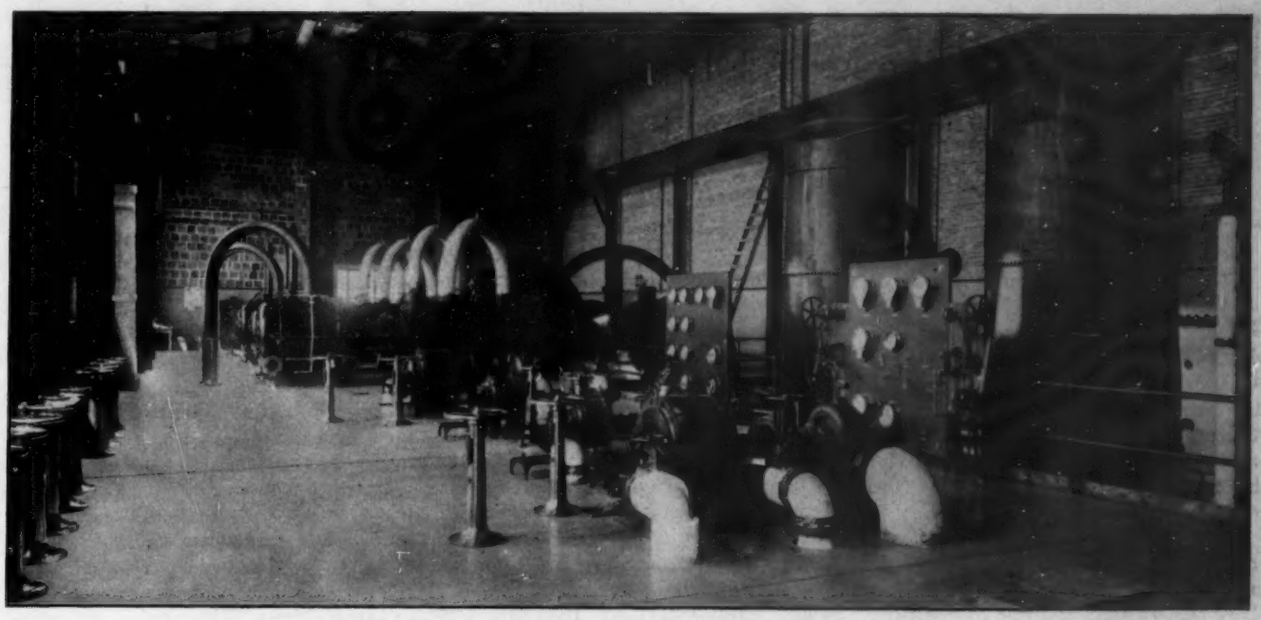


Fig. 4—Compressor Room at the New Plant

on Sixtieth Anniversary

straight line and are brought into the machine shops and finishing buildings at the ends opposite the shipping tracks.

The southern half of the plant is laid out in a similar manner, raw materials for the brass and steel foundries and pipe shops being received and stored in adjacent buildings. The machine shops for finishing the steel and brass castings directly adjoin the foundries, final finishing operations being performed immediately contiguous to the shipping platforms and tracks. All outgoing shipments will be handled over the four tracks shown in the center in Fig. 3.

The arrangements for insuring the quick transportation of products from one department to another or from railroad cars to storage, include traveling cranes, telphers, tractors and three-wheeled hand trucks, which can be used as trailers.

The continuous foundry methods which have been pursued successfully for a number of years at the malleable foundry of the Crane Co., as described in *The Iron Trade Review,* May 11, 1911, will be followed as far as practicable in the malleable, gray iron, steel and brass foundries at the new works. The experience gained by the Crane company in its 60 years' existence has resulted in the new plant being designed along lines that will permit rapid production with a minimum of manual labor.

The opening of the new works occurred just three days before the company celebrated its sixtieth anniversary. On July 4, 1855, R. T. Crane poured the first casting in a small plant which he had opened at Canal and Fulton streets, Chicago. Mr. Crane made the mold with sand found on the premises, melted and poured the metal, shook out and cleaned the casting and delivered it to the customer himself. Mr. Crane served as president of the Crane Co. for 57 of the 60 years of its existence, and witnessed its growth until his plants covered more than 10,000 times the space occupied by his original brass foundry on Canal street.

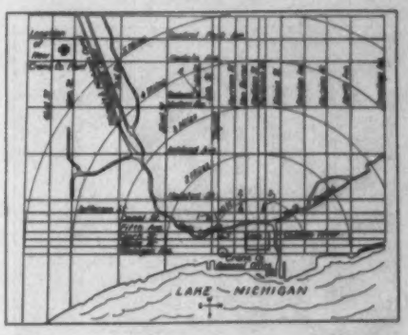


FIG. 5—LOCATION OF PRESENT PLANTS: (1) CAST IRON AND MALLEABLE; (2) FLANGE FITTINGS; (3) BRASS; (4) PIPE SHOP; (5) WAREHOUSE

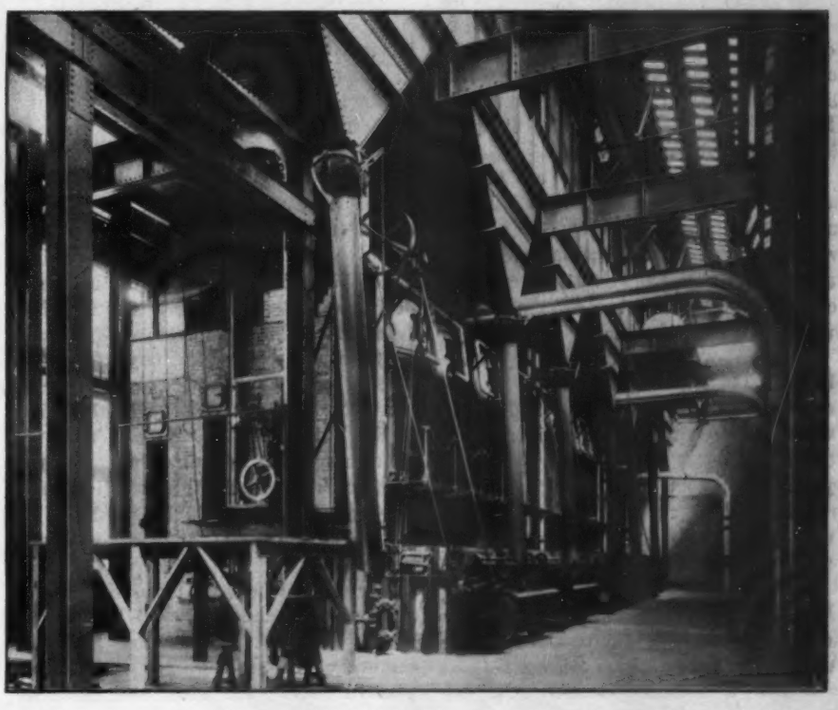


FIG. 6—BOILER ROOM IN NEW POWER HOUSE

News of Employers and Employes

Details of an Interesting Plan for Developing a Large Community Settlement—Labor Shortage Unlikely

THE INDIAN HILL CO., a Massachusetts corporation capitalized at $100,000, comprising officials of the Norton Co., and the Norton Grinding Co., Worcester, Mass., the plants of which employ between 700 and 800 men in normal times, has announced its plans for the development of about 90 acres into a community settlement on which houses will be constructed for the use of the employes of the two works and their families.

The settlement is situated on the south side of Indian hill, familiarly known as Mt. Ararat, which is 780 feet above the sea level and one of the highest points around Worcester. It is considered an ideal spot for development purposes. The site overlooks Indian lake and gives splendid views of Bancroft tower and a considerable portion of the city of Worcester.

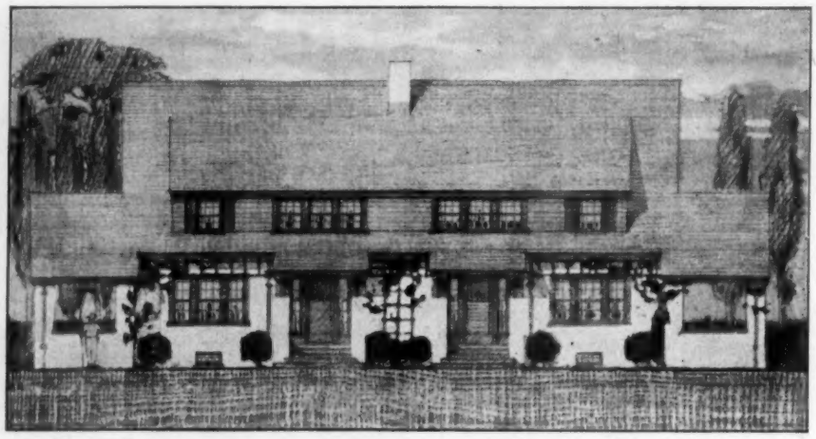
Even though they were not barred out by the restriction which will be imposed, the topography of the hillside would itself prevent encroachment by factories. The hillside, too, lends itself to home development because of its elevation and good drainage.

The plan of development was originally initiated in 1913 to afford an opportunity for the workmen of the two companies to live in healthful surroundings and to own their own homes by some method of payment which would enable them eventually to reimburse the company for these homes without bringing any great burden upon the financial resources of the workman. During the first year of 1913, similar developments were studied, Charles L. Allen, treasurer of the Indian Hill Co., who has a similar position with the Norton Grinding Co.; treasurer, Chas. L. Allen; general manager, George N. Jeppson, assistant superintendent of the Norton Co.; secretary and counsel, Aldus C. Higgins. The company was fortunate enough to secure the services of Grosvenor Atterbury of New York, one of the most widely known consulting architects in the United States, and, under his guidance, the plans have been perfected and actual work started. Mr. Atterbury pointed out some of the advantages of the garden city plan at a recent mass meeting of employes of the two companies. He said the elimination of speculative profits and the distribution of the payments for the home over a period of years bring these ideal dwellings within the reach of all who desire to improve their home conditions.

The natural beauty of the site will be enhanced by the plans of Mr. Atterbury for street layouts and landscape features. The streets are laid out in graceful lines; the kind and character of the buildings will be controlled; trees, shrubs and grass plots will abound, and everything will be done to promote the esthetic value, because it has been proved in the European developments that the esthetic value also has tremendous practical value. In general, the planting scheme will follow a definite plan designed to give uniformity to the development. The streets will be thoroughly constructed and along the most modern lines, granolithic sidewalks will be laid throughout the entire tract and grass plots will separate these sidewalks from the gutters.

The houses will be single family detached houses or two-family semi-detached houses. The semi-detached house is a particularly attractive moderate cost building. They are not very common in New England, but in Baltimore, Washington, and many other cities they are very popular. There will be none of the sameness in construction and outline which characterizes some of the wholesale methods of construction of moderate-cost homes. There will be a great deal of individuality to each house, but utility and durability will be kept in mind at all times.

TYPE OF SINGLE HOUSE



TYPE OF TWO-FAMILY, SEMI-DETACHED HOUSE

Labor Shortage is Not Feared

Iron and steel mills in the Pittsburgh district need fear no immediate danger of a labor famine, according to W. M. Poser, chief of the distribution branch of the United States immigration service, 406 Berger building, Pittsburgh. Mr. Poser told *The Iron Trade Review* a few days ago that hundreds of men in the Pittsburgh district are

eagerly looking for employment. The Maryland Steel Co. has sent out a call for a large number of men to work at Sparrows Point, Md., where three year's work and wages ranging from $2 to $4 a day are guaranteed. More than 200 men applied at the Pittsburg bureau the day following the receipt of the call from the Maryland company.

"We have calls from 25 to 30 men a day who are anxious to obtain employment," Mr. Poser told *The Iron Trade Review*. "While it generally is believed industries will continue to enjoy activity, yet we see no signs of a labor famine at present. Carpenters, boiler makers, blacksmiths and many day laborers approach us every day for employment and it seems as if we have 100 men for every position we have to offer. We had been requested to send men to distant points, but most of the applicants are not financially able to leave town. Many of them have not earned a penny for several months."

For Open Shop

As a result of a meeting of fabricators and erectors of Milwaukee, the open shop principle will be uniformly adopted by practically every structural shop in the Milwaukee district. The Milwaukee Fabricators society, meeting with representatives of other Milwaukee fabricators and erectors, decided to apply for membership in the National Erectors Association and open employment to non-union as well as union workmen. Large erectors such as Lakeside Bridge & Steel, Wisconsin Bridge & Iron and others have been operating as open shops for several years. The movement for a uniform open shop in this trade was started some time ago and it is stated that all but one or two shops have now agreed to adopt the policy.

Safety Code

Drafting of a code for safety and sanitation in the foundries of Pennsylvania has been practically completed by a committee named as auxiliary to the state industrial board. The rules will be promulgated by the board as soon as approved at a public meeting. The committee consists of James C. Cronin, state board, chairman; Otto G. Hitchcock, Hays Mfg. Co., Erie.; Maurice E. Campbell, Reading Stove Works, Reading; J. S. Stoddard, American Steel Foundries Co., Chicago; George Matlack, Cramp Ship Building Co., Philadelphia; John R. O'Leary, Cincinnati; Charles Witham, Reading; Valentine Barie, Pittsburgh; Charles B. Torpey, Philadelphia.

Personals

Shellman Brown, of Philadelphia, has been made superintendent of the Warren Foundry & Machine Co., Phillipsburg, N. J., succeeding Walter Ingham, who recently resigned after service with the company of 23 years.

E. J. Vetter, for several years connected with the Pittsburgh office of the American Steel & Wire Co., has been transferred to the New York office of that concern. Mr. Vetter is connected with the sales department.

J. H. Regan, assistant to President F. N. Hoffstott, of the Pressed Steel Car Co., at the executive offices in New York City, is in Russia looking after the orders for cars and other equipment of his company in that country.

W. M. Wyeth, formerly with the United States Metal & Mfg. Co., New York, has become the representative in New York City and vicinity, of John J. J. Caine, Philadelphia, iron and steel, with headquarters at 1206 West Street building.

William A. Sproull has resigned as president of the Traffic Club of Pittsburgh. Mr. Sproull, who has been traffic manager of the Cambria Steel Co., with headquarters at Pittsburgh, has resigned to take charge of the traffic and transportation bureau of the Philadelphia chamber of commerce.

J. D. Ormrod, of Emaus, Pa., has been elected president of the Donaldson Iron Co., Emaus, Pa., manufacturer of cast iron pipe. He succeeds in that position his father, Geo. Ormrod, who recently died at his home in Allentown at an advanced age. The new president has been serving as vice president and superintendent.

Sir Thos. Shaughnessy, president of the Canadian Pacific railway, returned from England on July 2 by the steamer Lapland. While abroad, Sir Thomas conferred with the British officials concerning the purchase of war supplies for the allies in Canada and it is announced arrangements have been made whereby the purchasing department of the Canadian Pacific railroad will be used as far as practicable for carrying on this work.

H. M. Montgomery, chairman of the Chicago section of the American Society of Mechanical Engineers, has been elected vice president and director of the Powdered Coal Engineering & Equipment Co., Chicago. This company is preparing elaborate plans for the construction and equipment of a large demonstration plant and research laboratory in Chicago where working demonstrations of the adaptation of powdered coal as a fuel to all forms of heat production will be carried on under engineering observation, aided by every influence that scientific research can bring to bear on the production of perfect combustion.

George Davies has been appointed general agent of the Davies & Thomas Co., Catasauqua, Pa., with offices in the new Equitable building, 120 Broadway, New York. This company, in addition to carrying on its general foundry business, now is engaged on a large contract for castings for one of the subway tunnels now under construction in New York. In this line of work, the Davies & Thomas Co. was among the pioneers in this country.

Hon. Baxter D. Whitney, of Winchendon, Mass., founder of the firm of Baxter D. Whitney & Son, machinery manufacturers of that town, observed the ninety-eighth anniversary of his birth, June 28. He started in business in 1849 and retired in 1900, since which time his son, William M. Whitney, has been the active manager. Mr. Whitney was the inventor and manufacturer of the first practical cylinder planer and made the first scraping machine and gage lathes in 1857.

Lorenzo C. Dilks has been elected president and general manager of Milliken Bros., Inc., Staten Island, N. Y., steel fabricators, succeeding Francis Dykes, resigned, who had held the title of vice president and general manager. William Solomon, of Wm. Solomon & Co., New York, who had been president of the company since its purchase and reorganization by the bondholders, about a year ago, has relinquished that office to Mr. Dilks. Mr. Solomon remains a member of the executive committee. Mr. Dilks resigns as general manager of sales of the Eastern Steel Co., with headquarters in New York, to accept the new position. Previous to the creation of this office by the Eastern Steel Co., about a year ago, he was contracting manager of the company in the New York territory. He has been associated with the Eastern Steel Co. for a number of years. Previous to that time, he was a member of the organization of the American Bridge Co., having been, for two years, manager of the Buffalo plants, and previous to that time, assistant to the vice president of the engineering department and assistant to the president of the company. He began his connection with the American Bridge Co. at the Pencoyd plant in 1893. He is a member of various engineering and technical societies and of the American Iron and Steel Institute. His residence is at Cranford, N. J. In addition to being president and general manager, Mr. Dilks will serve as a director of Milliken Bros.

Large Tool Orders Are Being Placed

Estimated More Than 500 Lathes Are Sold in East—Inquiries for Small Tools Appear in Cincinnati Market

LARGE ORDERS for machine tools again are being placed by companies whose plants are engaged in the manufacture of munitions of war. This business involves chiefly lathes which are being bought in large quantities for future delivery. Although it is impossible to obtain definite figures, indications are that well over 500 lathes were sold in the east during the week. The largest buyer of equipment was the New England Westinghouse Co., which placed orders for several hundred tools, principally lathes. Another large buyer was the Remington Arms Co., which also placed orders for a great number of tools. Both these concerns still are in the market. The International Steam Pump Co. also bought a large amount of machinery and still is in the market; this company has a war contract which it is to fill at its Harrison, N. J., plant. The Union Mfg. Co., New Britain, Conn., which is erecting large additions to its plant, is in the market for a large number of tools, on which it is taking prices. The Lake Torpedo Boat Co., Bridgeport, Conn., which is doubling the capacity of its plant, is inquiring on a large amount of equipment. Altogether, in addition to the business placed, there is a large amount of business pending which probably will be placed without delay.

A notable feature of the inquiries from "war buyers" is that the demand for the larger sizes of lathes is growing in volume. A large buyer in the east is the General Vehicle Co., Long Island City, which has closed for equipment for manufacturing motor trucks. The Nathan Mfg. Co., New York, which is engaged on a war contract, has made some additional purchases. The export demand for machine tools is not quite so active as in preceding weeks.

The purely domestic demand in the east, although improving, still is far from normal. The crane market is quiet, although, as previously reported, a large amount of business is pending. The Bethlehem Foundry & Machine Co., South Bethlehem, Pa., has awarded a 25-ton crane to the Pawling & Harnischfeger Co. The Ludlum Steel & Spring Co., Watervliet, N. Y., has placed an order for two 5-ton cranes. William Cramp & Sons Ship & Engine Building Co., Philadelphia, is in the market for cranes. Among concerns in the east who are expanding their capacity are the Globe Malleable Iron & Steel Co., Syracuse, N. Y.; the Hendee Mfg. Co., Springfield, Mass.; the Fore River Ship Building Corporation, Quincy, Mass.; J. B. Carr Chain Co., Troy, N. Y.; Gould Storage Battery Co., Depew, N. Y.; Covert Motor Vehicle Co., Lockport, N. Y.; Stonington Mfg. Co., Stonington, Conn.; Colt Patent Firearms Co., Hartford, Conn.; Erie Forge Co., Erie, Pa.; Baltimore Tube Co., Baltimore; Abbott Ball Co., Hartford, Conn.; Bridgeport Piston Ring Co., Bridgeport, Conn., and numerous others.

Proposed Extensions Point to Continued Activity

Contemplated extensions and improvements to rolling and finishing mills in the Pittsburgh district give machine tool dealers assurance that activity will continue to feature the market for at least several months more. Stockholders of the Wheeling Steel & Iron Co., Wheeling, W. Va., have approved a $5,000,000 bond issue, $2,500,000 of which will be used for improving and increasing capacity. A combination skelp and sheet bar mill will be installed at Benwood and the tube mill at that center will be remodelled and enlarged. Capacity at the tin plate plant of the company at Yorkville, O., will be doubled, it being planned to add 10 new mills. The Knox Pressed & Welded Steel Co. has purchased a 38-acre site at Wheatland, near Sharon, Pa., and will erect and equip a modern plant as soon as possible. The Columbia Sheet Steel Co., recently capitalized at $600,000 for the erection of a sheet plant at East Liverpool, O., may buy some of the sheet mill equipment, formerly used by the Zug Iron & Steel Co., Pittsburgh.

The Carnegie Steel Co., which recently has been buying considerable equipment for its new steel tie finishing plant at Munhall, Pa., has entered the market for a motor-driven bending roll, to bend 120 inches of ½-inch plate, for the Galveston, Tex., warehouse and for two shears for shearing angles, channels and beams, this equipment to be installed at the plant at Clairton, Pa.

Domestic Inquiries are Few at Chicago

Deferred delivery and much increase in prices appear to have put a quietus on domestic demand for machine tools from ordinary users. Every shop able to continue on its present equipment seems to be making the best of the situation and has deferred additions until conditions are better. Some business is being done in a miscellaneous way among concerns taking equipment far removed from the lines which war demand has rendered scarce, but ordinary machine shops are not in the market. The tide of shipments of lathes, drills and screw machines toward the east and into Canada continues unabated and every machine which can be obtained is being forwarded on the standing orders left by munition makers nearer the Atlantic. The plant of the Fred W. Wolf Co., 827 Rees street, Chicago, has been placed on the market and considerable competition is aroused among machinery dealers to obtain possession of the equipment. This concern has been engaged in the manufacture of refrigerating machinery for a number of years and the equipment is well suited to war needs.

Increased Prices Do Not Effect Demand

In Cincinnati, the recent gradual advance in the price of machine tools has had no effect upon demand, and the market still is swamped with inquiries for lathes, radial drills and milling machines. Bench tools, such as small grinders and drills also have sprung into good demand recently. Very few new sales are being made, as machine tool manufacturers here have sufficient orders to run them several months. The principal source of demand is from domestic plants which have indirect war orders. The American Rolling Mill Co., Middletown, O., has installed a number of machine tools, and now is machining parts of shrapnel shells.

A recent installation of our Wood Blocks in the plant of the Commonwealth Steel Company, Granite City, Ill.

Users Know Best

WHEN you wish to obtain correct information regarding the practicability and true value of a product, the place to go is direct to the users of that product. *Users* will eliminate all theory. They will place before you nothing but the cold, hard facts in the case. Good features will be endorsed; defects will be revealed.

The first sale of

Ayer & Lord Interior Wood Blocks

was the hardest that we have had to make. Since then our sales have been getting easier and easier, until now we have reached the point where our blocks practically sell themselves.

This is because "*users know best,*" and what they have to say about **Ayer & Lord Interior Wood Blocks** leaves no room for argument.

Following Are the Opinions of a Few Users:

"We are glad to state that your wood paving blocks, after all other materials have proven a failure, are very satisfactory."

"Around our plant we have never had any flooring of any kind that has stood trucking so well."

"We highly recommend it for rolling mills or other factories where heavy weights are moved by trucks."

"We have three of your wood block floors in our shops and they prove very satisfactory indeed."

The excellent service given by *Ayer & Lord Interior Wood Blocks* in other plants resulted in our being able to present to you the above illustration. This company produces large car truck frames. The huge steel castings and the extensive trucking would soon have proved disastrous to any other kind of flooring.

Write for our little booklet—
"FLOORS"

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

CLEVELAND, OHIO
926 Illuminating Building

KANSAS CITY, MO.
1117 Rialto Building

MEMPHIS, Tenn.
1402 Exchange Building

PHILADELPHIA, PA.
319 Perry Building

EASTERN STATES

LEOMINSTER, MASS.—Wellington Piano Case Co. has been awarded a large contract by the Westinghouse interests for gunstocks.

QUINCY, MASS.—Architects Monks and Johnson, 70 Devonshire street, Boston, are drawing plans for the proposed $600,000 addition to be erected in Quincy for the Fore River Ship Building Corporation.

SPRINGFIELD, MASS. — New England Westinghouse Co. has bought a large number of lathes and other equipment within the week and still is in the market.

WESTFIELD, MASS.—Hendee Mfg. Co., manufacturer of motor cycles, is reported to be considering the purchase of the Pope Mfg. Co.'s plant in Westfield to be used as an extension to the present large plant at Springfield.

BRIDGEPORT, CONN. — Lake Torpedo Boat Co., which is doubling its capacity, is taking bids on a large amount of machinery.

BRIDGEPORT, CONN.—Bridgeport Piston Ring Co. has plans under way for a 1-story and basement, 75 x 33-foot factory, to be located on Third street.

BRIDGEPORT, CONN.—Remington Arms Co. has placed orders for a large amount of additional equipment and still is in the market.

HARTFORD, CONN. — Abbott Ball Co., Elmwood, is having plans drawn for a 2-story, 45 x 52-foot addition.

HARTFORD, CONN. — Hartford Machine Co. has let contract for a four and 6-story, 47 x 206-foot factory and office building.

HARTFORD, CONN.—W. C. & C. E. Walker have let contract for a 3-story, 52 x 208-foot factory building to be erected on South Prospect street.

HARTFORD, CONN. — Colt Patent Firearms Mfg. Co. has decided to double its capacity by making use of a 3-story factory adjacent to its present main building.

MERIDEN, CONN.—Columbia Mills, Inc., which formerly manufactured curtain fixures, is understood to have sold its large plant long idle, to a Pennsylvania machinery manufacturing concern. The name of the company has not been announced.

NEW BRITAIN, CONN.—Union Mfg. Co., which recently let the contract for a 5-story and basement, 150 x 150-foot addition, is inquiring on a large number of machine tools.

STONINGTON, CONN.—Stonington Mfg. Co. has let contract for an addition.

WOONSOCKET, R. I.—Taft-Pierce Mfg. Co. has let the contract for a 5-story, 50 x 100-foot addition.

DEPEW, N. Y.—Gould Storage Battery Co. has let a contract for a 2-story, 75 x 200-foot addition.

HUDSON FALLS, N. Y.—Adirondack Garage Co. has been incorporated; $50,000 capital stock; by George N. Nay, E. V. Bulow and Frank G. Sherman.

LOCKPORT, N. Y.—Covert Motor Vehicle Co. has let a contract for a 3-story, 46 x 92-foot addition.

NEW YORK.—Thomas Townsend & Co., 2 Rector street, are in the market for a 10-ton crane.

NEW YORK.—Architect J. Martyn Haenke, 15 Broad street, has started work on plans for a 5-story, 70 x 300-foot factory building, to be erected at the foot of Fulton street, Brooklyn.

NEW YORK.—International Steam Pump Co. has purchased a large amount of equipment for installation at its Harrison, N. J., plant, to be used in turning out a war contract. This company still is in the market for miscellaneous requirements.

NIAGARA FALLS, N. Y.—United States Light & Heat Co., machinery, apparatus for producing light, heat and power; contracting, ores, minerals, has been incorporated; $7,000,000 capital stock; by A. Stanley Jones, Albert L. Fowler and Guy M. Walker, 60 Broadway, New York.

OLEAN, N. Y.—Cattaragus Engineering Co. has been incorporated; $5,000 capital stock; by Fred J. Kimmey, Carleton Ruhe and F. H. Higgins.

SYRACUSE, N. Y.—Globe Malleable Iron & Steel Co. has let contract for a 1-story, 18 x 26-foot addition to its foundry on Greenway avenue. This company is reported to have purchased some steam hammers and other equipment.

SYRACUSE, N. Y.—Directors of the Kentucky Solvay Coke Co., at a meeting recently held in Syracuse, decided to double the capacity of the company's plant at Clyffside Park, Ashland, Ky. The number of ovens will be increased from 52 to 104 and the rest of the plant correspondingly.

TROY, N. Y.—J. B. Carr Chain Co., 25 Smith avenue, has let contract for a 3-story, 100 x 300-foot plant, to be erected at Watervliet.

BEAVER, PA. — Youngstown & Southern railroad is considering the extension of its Beaver valley lines to Beaver Falls.

CANNONSBURG, PA. — Work has been started on a 12-mill addition to the works of the Standard Tin Plate Co., which will give the company a 22-mill plant. Inquiries for equipment have been sent out, as previously reported.

ERIE, PA.—Erie Forge Co., it is understood, shortly will erect a foundry addition.

ERIE, PA.—Continental Rubber Co. soon will take bids on revised plans for a 1-story, 70 x 100-foot addition.

ERIE, PA. — Stirling-Warfel Mill Supply Co., capital $40,000, has been incorporated by John Stirling, Rudolph S. Warfel and Marian Stirling, all of Erie.

LEECHBURG, PA.—W. L. Bessolo plans to build a plant for the manufacture of a patentive pipe wrench.

McKEES ROCKS, PA.—Federal Enameling & Stamping Co. has increased its capital stock from $150,000 to $187,500.

MEADVILLE, PA.—Industrial Fund Association, headed by E. W. McGill, has returned from Pittsburgh and reports prospects for securing a new industry in Meadville.

NEW BRIGHTON, PA.—Plant of Townsend Rivet Co. suffered heavy damage by fire.

NEW CASTLE, PA.—Standard Steel Car Co., whose plant recently was damaged by fire, has awarded contracts for new buildings and is buying some new equipment.

NEWCASTLE, PA.—Edenburg Foundry & Mfg. Co., recently incorporated, has more than 100 acres of land under lease or option and will erect a plant, it is reported, for the manufacture of car wheels, brake shoes, grate bars and castings.

PITTSBURGH. — Northern Railway Signal Co., capital $15,000, has been incorporated by Joseph P. Taggart, E. A. Schooley, Pittsburgh, and Herbert L. Stitt, Edgeworth.

PITTSBURGH.—Ground was broken July 5 for the new city-county building which will require about 7,000 tons of structural steel.

PITTSBURGH.—Automatic Gas Steam Radiator Co. has been incorporated; $5,000 capital stock; by Thomas C. Hughes, F. M. Cain, T. J. Easterbrook.

PITTSBURGH.—Verona Steel Casting Co., with works at Verona, Pa., is increasing capacity and some new equipment has been purchased.

PITTSBURGH.—Huessener Engineering Co. has been organized to manufacture mechanical devices for the economical combustion of coal; capital $25,000; H. Huessener is manager.

PITTSBURGH.—E. C. Brainerd, representing F. F. Nicola, has leased 54 x 110 feet in lower Penn avenue to the George S. Daugherty Co., wholesale grocers, who will erect a 6-story warehouse building, of steel construction.

PITTSBURGH.—Pittsburgh Boiler & Tank Co. has been incorporated with a capital of $250,000 at Dover, Delaware, to manufacture and sell iron and steel and other materials, by F. D. Buck, George W. Dilman and L. L. Horty.

PITTSBURGH.—Pittsburgh Piping & Equipment Co. has purchased from the Consolidated Gas Co., about 110 x 95 feet near Thirty-fifth street and Smallman street; the new property adjoins the present site of the Piping & Equipment company.

PITTSBURGH.—R. H. Boggs has purchased property, 100 x 332 feet, in McKees Rocks; several buildings of the Fort Pitt Spring & Mfg. Co. are on the property; no official information relative to future plans has been given out.

PITTSBURGH.—Electro-Hydro Carbon Oil & Sulphur Co. has been incorporated in Delaware to engage in the developments of oil, gas, sulphur, etc., in western Pennsylvania. The incorporators are Herbert E. Latter, Normon P. Coffin, of Wilmington, Del., and Clement Egner, of Elkton, Md.

PITTSBURGH.—Carnegie Steel Co. is in the market for a motor driven bending roll, to bend 120 inches of ½-inch plate, for installation in the recently opened warehouse at Galveston, Tex., the company also is asking bids on two shears, either motor or hydraulic driven, for shearing angles, channels and beams at the plant at Clairton, Pa.

PITTSBURGH.—Pittsburgh Speedway Association, capitalized at $1,500,000, has been incorporated in Delaware by Herbert E. Latter, Normon P. Coffin, of Wilmington, Del., and Clement M. Enger, Elkton, Md.; the company will conduct a general automobile business and will manufacture all kinds of vehicles; organizers propose to erect an automobile speedway.

PITTSBURGH. — Knox Pressed & Welded Steel Co. has purchased a 38-acre site at Wheatland, near Sharon, Pa., where its proposed plant will be erected. It is stated the new building will be 130 x 700 feet. It will be equipped with modern machinry, contracts for some of which have been placed; the Blaw Steel Construction Co. will erect the buildings; the Knox company now occupies plants of the Sharon Boiler Co., Sharon, Pa.

VINTONDALE, PA.—Vintondale Colliery Co. will erect a new power plant, to cost $50,000. The company will furnish the light for the city.

WILKES BARRE, PA.—Architects Sturdevant & Poggi, Coal Exchange building, have about completed plans for the proposed $200,000, 1-story colliery shop to be built in Wilkes Barre for the Lehigh & Wilkes Barre Coal Co.

BLOOMFIELD, N. J.—Owen A. Rogers, formerly connected with the Edison organization in West Orange, N. J., shortly will break ground for a 1-story factory building, 40 x 70 feet, here, which will be devoted to die-cutting. Mr. Rogers, until recently maintained a small shop at the plant of the Hudson Rolling Mill, Bloomfield, which now is being dismantled.

LYNDHURST, N. J. — Canadian Car & Foundry Co., Ltd., has leased a site near the Lackawanna railroad shops in Lyndhurst and will erect a structure 1,350 x 327 and 460 feet. The building will be used for the storage and assembling of shells and parts of shells received from factories in various parts of the country where they are being made.

NEWARK, N. J.—Franklin Gruman, 209 Washington avenue, is building an extension to his factory building at 77 St. Francis street.

NEWARK, N. J. — Jarrett-Chambers Co., Inc., 30 East Forty-second street, New York, has contract for erecting 50 x 160-foot plant

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Equitable Building — New York City

Ore Mines in Peru — Furnaces in Pittsburgh, Pa.

at Avenue R and Passaic river in Newark for American Synthetic Dyes Co. of New York.

BALTIMORE.—Baltimore Tube Co. has let contract for a 1-story addition.

WASHINGTON. — The bureau of supplies and accounts will receive bids until 10:00 a. m., July 20, for brass, copper, steel plates, brass tubing, etc., for the Puget Sound navy yard.

CENTRAL STATES

AKRON, O.—Miller Rubber Co. has purchased ten acres along the canal, near Kenmore, O., and a portion of the plant may be removed to this site, according to President Jacob Pfeiffer.

CINCINNATI. — Krippemdorf-Dittman Co. will erect a $19,600 1-story factory building at Seventh and North streets.

CINCINNATI—Automatic Nut Cracker Co. has geen incorporated; $5,000 capital stock; by F. J. Burkhart, Lillian Burkhardt, Carl Bing, I. M. Bing, Melvyn G. Loewenstein.

CINCINNATI.—Cisco Machine Tool Co. has been incorporated; $50,000 capital stock; by H. C. Busch, J. I. Stephens, James A. Sebastian, G. M. Horton and J. N. Stallman.

CINCINNATI.—Zettle & Rapp, architects, are preparing plans for a $150,000, 6-story, steel frame building to be erected at Eighth and Broadway streets.

CINCINNATI.—Work on the new approach of the Covington and Cincinnati bridge from Third street, will be begun shortly. This will comprise an expenditure of $1,500,000 and will require a large tonnage of structural steel. Plans for the steel requirements have not been completed.

CINCINNATI. — Tubular Products & Steel Works, Pittsburgh, has acquired 50 acres at the intersection of the Pennsylvania railroad and Cherry Hill avenue, in Reading, a suburb, and will build a high carbon steel tube manufacturing plant. The proposed plant will occupy 15 acres, and homes for employes will be built upon the remaining 35 acres. The first factory building will be 100 x 300 feet and will be followed shortly by another of the same size. The tubes will be made by the electric welding process, and are used in the manufacture of agricultural machinery, iron beds, etc. The company will use 2,000 kilowatts of electricity per hour, and 150,000 feet of natural gas per day. It has a capitalization of $750,000, and has been financed entirely by Pittsburgh capital. John K. Ewing Jr. and J. W. Bolinger are two of the officials.

CLEVELAND.—Anderson Rolled Gear Co. has increased its capital stock from $100,000 to $150,000.

CLEVELAND—Rauch & Lang Carriage Co. has changed its name to the Baker, R. & L. Co. and increased its capital stock from $1,000,000 to $2,500,000.

CLEVELAND. — Commissioner of purchases and supplies will receive bids until noon, July 14, for air compressors for the West Side tunnel.

CLEVELAND.—George S. Rider & Co., engineers, are preparing plans for a factory building, two stories, 142 x 512 feet. The owner's name is withheld.

CLEVELAND.—Hydraulic Pressed Steel Co. has had plans drawn by its own engineering department for a $75,000, 1-story, 75 x 350-foot factory, of brick and steel construction, to be erected on adjoining the present plant at 3152 East Sixty-first street. Shrapnel castings will be manufactured. A. W. Ellenberger is president; H. F. Pettee, secretary-treasurer.

COLUMBUS, O.—W. E. Murbarger, president of the Monarch Spring Co., Indianapolis, is interesting Columbus capital in a company which is to take over the present concern and move the plant to Columbus. It is planned to increase the output from 100 to 500 pairs a day. The product is used on horse-drawn vehicles to lighten the pull.

DAYTON, O.—The city commission will advertise shortly for the erection of three large bridges, one at Fifth street, one at Webster street, and another at Keowee street.

FOSTORIA, O.—H. & M. Screw Co. has changed its name to the Fostoria Screw Co. and has increased its capital stock from $20,000 to $100,000.

FOSTORIA, O.—Allen Motor Co. has chosen Harlan Jones, architect, Galion, O., to prepare preliminary plans for a $30,000 factory addition, one story, 120 x 300 feet.

GALION, O.—Delegation of business men has asked the county commissioners for the construction of a bridge over North Columbus street.

GREENTOWN, O. — Greentown Aluminum Co. has been incorporated; $25,000 capital stock; by A. C. Myers, Claude K. Donat, F. O. Boston, Harvey O. Weary and R. P. Hoover.

HAMILTON, O. — Mosier Safe Co. will erect a $2,200 addition to its power plant.

LIMA, O.—Gramm Motor Truck Co. will erect a $20,000, 1-story, 75 x 327-foot addition, of reinforced concrete, to its plant on South Metcalf street.

LIMA, O. — Gramm-Berstein Co., manufacturer of motor trucks, is remodeling its present plant and will erect a 50 x 200-foot factory and a 2-story office building. The company also has leased from the Lima Brewing Co. a building, 70 x 120 feet, which will be remodeled. The working force will be doubled.

MIDDLETOWN, O.—Butler Cycle & Electric Co. has been incorporated; $10,000 capital stock; by J. A. Pratt, Gordon Gage, E. C. Speier, H. D. Riley, E. Reed and H. Schuller.

MT. VERNON, O.—Licking county commissioners will erect a bridge over Dry creek, near St. Louisville.

NEW PHILADELPHIA, O.—J. De Witt and members of the New Philadelphia Improvement Co. plan the erection of a plant in this city for the manufacture of paving blocks.

ORRVILLE, O.—Security Metallic Grave Vault Co. has been incorporated; $200,000 capital stock; by D. C. Boyd and others. A factory will be established in Orrville and negotiations are under way for the purchase of the old Orrville Planing Mill property.

PAINESVILLE, O.—This city has voted $35,000 bonds for repairs to the municipal light plant. H. Whitford Jones, Cleveland, has prepared preliminary plans for the work.

PAINESVILLE, O.—A representative of the Cleveland-Ford Tire Co. has inspected the old Foyer plant and is negotiating with the Commercial club as to establishing a plant. The company's tires now are being made in Akron under contract on its own cores and molds.

SPRINGFIELD, O.—This city has taken the initial steps toward the installation of a boulevard street lighting system.

TOLEDO, O.—Toledo Electro-Plating & Stamping Co. has been incorporated; $50,000 capital stock; by T. H. Gardner and others.

TOLEDO, O.—National Surfacing Machine Co. has been incorporated; $25,000 capital stock; by F. K. Hogue, N. S. Bassett, C. W. Hogue, L. J. Weadock and W. F. Watts.

TOLEDO, O.—Schiewe Storage Co., main office in Detroit, has awarded to Theodore Sterritt, Detroit, the contract for the erection of a $50,000, 7-story storage building in Toledo.

TROY, O.—Bids will be received shortly by the county commissioners for alterations and additions to power house.

URBANA, O.—The county commissioners have approved plans for the Moody bridge, the Pence bridge, and the McLaughlin bridge.

UHRICHSVILLE, O.—United States Clay Products Co., incorporated about a year ago, will begin work within 30 days on a $95,000 sewer pipe plant.

WARREN, O.—Bids for the Summit street bridge have been rejected by the county commissioners and will be immediately readvertised

WILLOUGHBY, O.—Standard Tire & Rubber Mfg. Co. has increased its capital stock from $100,000 to $500,000.

XENIA, O. — Hinkle Mfg. Co. has been formed recently to take over the patent rights of the Power Tire Spreader from D. G. Powers, a Xenia blacksmith, and manufacture it. The device, used for carriage and wagon wheels, will be manufactured under contract until it is possible to erect a factory in Xenia.

YOUNGSTOWN, O.—The city council has agreed to a $100,000 bond issue to complete water works improvements.

YOUNGSTOWN, O. — Frank H. Vogan, clerk of county commissioners, will open bids July 21 for building a bridge in Green township; certified check for $100 required.

YOUNGSTOWN, O.—Representatives of a Cleveland manufacturing concern have approached the Mahoning Land Co. and R. T. Izant, trustees of the Adams property opposite Avon Park, regarding a factory site.

YOUNGSTOWN, O.—William Tod Co. is making improvements to its plant; new foundations for some heavy machinery are being built, smoke stacks are being replaced and some new equipment will be installed.

YOUNGSTOWN, O. — Commissioners of Trumbull county, the Carnegie Steel Co. and railroad interests have purchased plats of land on either side of the Mahoning river at McDonald, for an overhead steel bridge; to be erected when the proposed Carnegie company plant is built at McDonald.

CHARLESTON, W. VA.—The State Board of Control, J. S. Lakin, president, will erect a building, 63 x 306 feet, of fire proof construction; bids will close July 27.

CHARLESTON, W. VA.—Contracts for the construction of an addition to Mechanical Hall at West Virginia University, Morgantown; a building for the school of medicine at that institute; a dormitory for the State College at Glenville and a science hall at Marshall College, Huntington, have been let by James S. Lakin of the State Board of Control; P. Q. Shrake & Son, New Matamoras, O., was the lowest bidder for the buildings at Morgantown and Longest & Tessier, Greensboro, N. C., was the lowest bidder for the buildings at Huntington and Glenville.

PHILIPPI, W. VA.—Several residents of this city are interested in the organization of a company to establish a new woolen mill, all but $500 has been subscribed.

WHEELING, W. VA.—Stockholders of the Wheeling Steel & Iron Co., at a special meeting June 30, favorably voted for a $5,000,000 bond issue, half of which will be used for the erection of a combination skelp and sheet bar mill, the remodeling of and an extension to the tube mill at Benwood, W. Va., and the addition of ten new plate mills at Yorkville, O., which will double the capacity of the tin plate plant; Isaac M. Scott, president of the company, advises improvement plans have not been worked out in detail.

WILLIAMSON, W. VA.—Armour & Co., Chicago, will erect a $25,000, 2-story refrigerating plant.

MAYSVILLE, KY.—The Mason fiscal court has ordered the erection of several bridges.

GARY, IND.—Gary Motor Truck Co. has been incorporated to manufacture trucks; $25,000 capital stock, by W. H. O'Donnell, C. W. Philips and W. J. O'Donnell.

INDIANAPOLIS.—Rice Mfg. Co. has been incorporated to manufacture tools, machinery

and dies; $15,000 capital stock; by A. J. Middleton, A. G. Rice and W. E. Hackett.

INDIANAPOLIS.—Parsons Metal Products Co. has been incorporated; $25,000 capital stock; by W. O. Parsons, G. C. Holtman, H. E. Parsons.

INDIANAPOLIS.—Board of public works is to co-operate with the county commissioner on two additional spans to the West Washington street bridge over White river at a cost of $110,000.

LADOGA, IND.—Arrangements are being made for a bond issue of $12,000 for a water-works plant. John D. Foster is city clerk.

LA PORTE, IND. — County commissioners are to build a 40-foot, steel span over the county line ditch. Engineer Miles, La Porte, is preparing plans.

RICHMOND, IND.—County engineer will submit plans soon to the county commissioners on two bridges, to cost $141,000, at South G and South E streets; one bridge is 34 x 725 feet and the other 34 x 600 feet.

RICHMOND, IND. — Richmond Adding & Listing Machine Co., recently incorporated with $750,000 capital stock, has purchased the new Veneer Door factory buildings in Beallview. Part of the equipment has been bought. Fred D. Bethard is president.

ATKINSON, ILL.—A. M. Morgan of Chicago, has prepared plans for a water works plant to cost $18,000.

BELLEVILLE, ILL. — Illuminating Specialties Mfg. & Supply Co. has been incorporated with a capital stock of $60,000 to manufacture gas making machinery.

CHICAGO.—Lever-Lock Co. has been incorporated; $2,500 capital stock; by Jacob Marker, Harry S. Cuss and Margaret Corrigan.

CHICAGO.—Union Stock Yards Transit Co. is to build a garage costing $20,000. C. S. Joy is architect.

CHICAGO.—G. Callahan, 5736 Indiana avenue, is to build a garage costing $25,000. T. R. Bishop is architect.

CHICAGO.—American Car & Foundry Co., Wood street, is constructing an addition to its shops, 66 x 205 feet, costing $20,000.

CHICAGO.—Octigan Drop Forge Co., Lowe avenue and Twenty-Fourth street, is inquiring for steam and power hammers.

CHICAGO.—Charn Vacuum Cleaner Co., 711 Fulton street, is to install equipment in a plant at Harvard, Ill.

CHICAGO.—Peerless Engineering Co. has been incorporated with a capital of $2,500, by Harry H. Stannard, Albert O. Olson and John H. Struve, 7127 Crandon avenue.

CHICAGO.—Abbott Auto Sheet Metal Co. has been incorporated; $2,500 capital stock; by Morris Ring, Harry H. Levy and Abraham Reiman, 4418 Langley avenue.

CHICAGO. — Imperial Vacuum Heating Co. has been incorporated; $30,000 capital stock; by William H. Beall, William V. Rifle and Burton U. Hills, 37 West Van Buren street.

CHICAGO. — Mundie & Jensen, architects, 39 South La Salle street, are taking bids on a $125,000 service station for the Packard Motor Car Co., five stories; 70 x 150 feet, of steel and brick.

CHICAGO.—Bermingham & Seaman Co., 7 South Dearborn street, are to build a $150,000, 7-story paper mill, 100 x 150 feet. Paul Gerhardt, 64 West Randolph street, is architect.

CHICAGO.—Northwestern Metal Spinning & Brass Mfg. Co. has been incorporated; $2,500 capital stock; by Alex Korwel, Geo. H. Wallin and William Glowacki, 1746 Lull place.

CHICAGO.—C. F. Massey Co., Thirtieth street and Kedzie avenue, railway supplies, has bought a site at Clearing, Ill., and will proceed at once to erect a brick and concrete plant.

CHICAGO.—Bottum Valve Co. has been incorporated to manufacture valves; $20,000 capital stock; by Lewis Hildebrand, George A. Bottum and George L. Bottum, 162 North Dearborn street.

Ten Timely Tips

Below find listed the most important new business items of the week. The quantity is eliminated but the quality remains. Even if your time is limited look over this column each week.

Thomas Townsend & Co., 2 Rector street, New York City, are in the market for a 10-ton crane.

Lake Torpedo Boat Co., Bridgeport, Conn., which is doubling its capacity, is taking bids on a large amount of machinery.

New England Westinghouse Co. has purchased a large amount of lathes and other equipment within the week and still is in the market.

Union Mfg. Co., New Britain, Conn., which recently let a contract for the erection of a 5-story, 150 x 150- foot addition, is inquiring for a large number of machine tools.

Remington Arms Co., Bridgeport, Conn., has placed orders for a large amount of equipment and still is in the market.

International Steam Pump Co. continues in the market for some miscellaneous requirements for its plant at Harrison, N. J.

Octogan Drop Forge Co., Lowe avenue and Twenty-fourth street, Chicago, is inquiring for steam and power hammers.

Tubular Products & Steel Works, Pittsburgh, will erect a plant on 15 acres of land in Reading, a suburb of Cincinnati, for the manufacture of high carbon steel tubes by the electric welding process. The first factory building will be 100 x 300 feet and will be followed shortly by another of the same size.

Carnegie Steel Co. is in the market for a motor driven bending roll, to bend 120 inches of ½-inch plate, for installation in a recently opened warehouse at Galveston, Tex. The company also is asking bids on two shears, either motor or hydraulic driven, for shearing angles, channels and beams at the plant at Clairton, Pa.

Stockholders of the Wheeling Steel & Iron Co., Wheeling, W. Va., favorably voted for a $5,000,000 bond issue, half of which will be used for the erection of a combination skelp and sheet bar mill, the remodeling of and an extension to the tube mill at Benwood, W. Va., and the addition of ten new tin plate mills at Yorkville. I. M. Scott, president, advises detailed plans have not been worked out.

SPRINGFIELD, ILL.—Frank D. Whipp, fiscal supervisor of Illinois, will receive bids until July 26 on a power house at the state hospital at Dunning, Ill., and for a power house at the state hospital at Elgin, Ill. Plans at the office of James I. Dibelka, 130 North Fifth avenue, Chicago.

BURKE, MICH.—Hercules Mine is considering erection of a smelting plant to care for its ore on the expiration of its contract with an outside smelter.

DETROIT.—City of Detroit, George H. Fenkell, commissioner of public works, City Hall, is about to build an $18,000 warehouse, 32 x 180 feet.

DETROIT. — James S. Holden, 1102 Penobscot building, is to erect a factory for the manufacture of machinery, two stories, 50 x 80 feet, costing $10,000

DETROIT.—Central Foundry Specialty Co. has increased its capital stock from $25,000 to $50,000 and has changed its name to the Central Specialty Co.

DETROIT. — Jefferson Aluminum Works has been incorporated to manufacture aluminum ware; $25,000 capital stock; by F. A. Cann, C. C. Terry and F. R. Petz.

LAKE ODESSA, MICH.—J. H. Hawkins, Grand Rapids, Mich., has leased the Michigan Art Carving Co.'s plant and plans manufacturing flooring. A switch will be built, a kiln erected and a considerable amount of machinery installed.

MANCELONA, MICH. — Bonds for $15,000 have been voted for a water works system.

LA CROSSE, WIS.—La Crosse Scrap Iron & Metal Co. has been incorporated; $5,000 capital stock; by M. M. Broad, S. G. Gordon, R. D. Gordon.

MILWAUKEE. — Fire resulting from a overheated cupola slightly damaged the plant of the Ajax Foundry Co., 435 Howell avenue. There was no serious interruption of work.

MILWAUKEE.—A. E. Schunk is about to erect a public garage and repair shop building on Lewis avenue, near Clarke street. It will be of concrete construction, 1-story, 46 x 143 feet in size. The architect is F. W. Andree.

MILWAUKEE. — Standard Oil Co. of Indiana is erecting a warehouse and distributing station at Grand avenue and Sixteenth street, to contain five 1,000 gallon steel tanks.

MILWAUKEE. — An expenditure of $514,000 was authorized by the board of directors of the Wisconsin (Bell) Telephone Co. at the quarterly meeting in Milwaukee. The amount covers new construction and repairs valued at $225,000 in Milwaukee and $289,000 at other Wisconsin points, and will be expended during 1915. H. O. Seymour, Milwaukee, is general manager.

RACINE, WIS.—Walker-Moore Mfg. Co., 330 Wisconsin street, Racine, manufacturing automobile parts, has changed its corporate style to Walker Mfg. Co. W. A. Walker is president and W. T. Walker is secretary and treasurer.

RHINELANDER, WIS.—Articles of incorporation have been filed in behalf of the Daniels Mfg. Co., Rhinelander. Capital stock is $10,000 and incorporators include J. S., A. D. and E. S. Daniels.

BELLEVILLE, MO. — Belleville Brick & Tile Co. has been formed by a merger of the Belleville Brick Co., the Ittner Brick Co. and the National Pressed Brick Co. Each of the former companies controlled two plants, five of which are located in Belleville, the sixth being in Mascoutah. The new company is capitalized at $500,000, of which $491,000 worth of preferred and common stock is held by Warren W. Ittner, trustee.

BOSWORTH, MO.—Henrici, Kent & Low-

ry, Reserve Bank building, Kansas City, Mo., have been engaged to prepare plans for an electric light plant.

DREXEL, MO.—This city is planning an electric plant to cost $10,000. Prof. Laffoon, care Union Electric Light & Power Co., St. Louis, is engineer.

KANSAS CITY, MO.—Success Silo System, 1300 Central avenue, is to erect a factory, 30 x 50 feet.

KEYTESVILLE, MO.—C. R. Crooper is to build a $9,000 electric plant, 35 x 35 feet. Henrici, Kent & Lowry, 716 Reserve Bank building, Kansas City, Mo., are engineers.

SPRINGFIELD, MO.—The board of regents of the Fourth District Normal school will erect an electric power plant on the campus to supply light for the buildings.

DUBUQUE, IA.—Illinois Central railroad, A. S. Baldwin, chief engineer, Chicago, is to build a $8,310 viaduct at Epworth to eliminate a grade crossing, on plans by the state highway commission.

PORT MADISON, IA.—D. L. Davis Co. has bought a site for a plant to manufacture a tire inflator.

BEMIDJI, MINN. — J. P. Raymond and Fred S. Raymond, Syracuse, N. Y., are planning to build an iron foundry to be located at Bemidji.

MINNEAPOLIS. — Weisman Brothers are preparing to build a hotel and store building, four stories, 100 x 110 feet with foundation sufficient to carry ten stories.

ST. PAUL.—B. H. Porreson is planning to build a plant for the manufacture of automobile plates.

THIEF RIVER FALLS, MINN.—Fire did about $3,500 damage to the Thief River Iron Works.

SOUTHERN STATES

NORTON, VA.—Norton Coal Co. will not rebuild power plant recently burned with about $20,000.

RICHMOND.—Richmond Forging Corporation will erect and equip a brass foundry at a cost of about $12,000.

BLAKELY, GA.—This city votes July 10 on $10,000 bonds to establish an ice plant.

CARTERSVILLE, GA.—This city votes July 17 on $5,000 bonds to extend water mains.

CLARKSDALE, MISS.—City voted $150,000 bonds to enlarge electric light plant, etc.; address city commissioners.

KOSCIUSKO, MISS.—Bonds of $30,000 have been voted for the construction of a municipal combined electric light and waterworks plant to serve the city and sell current commercially. C. O. Townsend, city clerk.

DALLAS, TEX.—Dallas Union Terminal Co. is to build an electric plant to furnish light for the new union depot at an expenditure of $60,000.

DALLAS, TEX.—Improved Farm Implements Co. has been incorporated; $100,000; by F. A. McNally, R. B. Sample and H. M Gardner.

DALLAS, TEX.—County commissioners are planning to erect a $100,000 bridge over Trinity river at Commerce street. J. F. Witt is county engineer.

ELGIN, TEX. — An election will be held July 16 on an issue of bonds amounting to $11,000 for constructing a water works plant.

PORT LAVACA, TEX.—City votes July 27 on $17,000 bonds to construct bridges and roads.

RULE, TEX.—Board of local improvements is considering construction of an electric light plant at a cost of $10,000.

LITTLE ROCK, ARK.—E. C. Wehrfritz Machinery & Supply Co. is to rebuild its machine shop and warehouse recently burned, at a cost of $75,000.

MALVERN, ARK.—Bids will be received until July 15 by G. E. Matteson, secretary improvements district, for a water works plant costing $90,000. W. L. Collie is city recorder.

BRISTOL, TENN. — Snyder Electric Furnace Co. will build a plant at Bristol for the manufacture of ferro-manganese and other minerals by an electrical process.

BRISTOL, TENN.—Iron City Stove & Foundry Co. has been reorganized with J. Gutman as president and will remodel and enlarge the plant.

DANDRIDGE, TENN.—The city will issue $10,000 bonds for the erection of an electric light plant; the mayor has details.

JACKSON, TENN. — Illinois Central railroad, with general offices in Chicago, will erect a new round house with a large turn table.

BOSWELL. — This city will receive bids shortly for electrical equipment for which $14,000 bonds have been voted. J. T. George, engineer, Ada, Okla.

JONES CITY, OKLA.—A special election will be held soon to vote on an issuance of bonds for building a municipal electric plant. Burnham Engineering Co., Oklahoma City, has been retained to prepare plans.

WESTERN STATES

WATERTOWN, S. D.—John S. Johnson, county auditor, is taking bids to close July 20 on a low box chord steel truss bridge, consisting of one 55-foot, one 60-foot and one 70-foot span.

OMAHA.—Graham, Burnham & Co., Chicago, are preparing preliminary plant for a 14-story bank building for the First National bank, at Sixteenth and Farnam street.

BURLINGTON, KAN.—Excelsior Mill Co. is planning construction of a hydro-electric plant on Neosho river.

LARNED, KAN.—Bonds will be received until July 19 on an electric light plant. Worley & Black, engineers, 301 Reliance building, Kansas City.

ROBINSON, KAN.—An election was carried recently authorizing $10,000 in bonds for an electric plant. Charles Rirkey is city clerk.

TOPEKA, KAN.—The city and the Topeka Railway Co. are to build a three-span reinforced concrete bridge at Kansas avenue, costing $20,000. A. R. Young is city engineer.

ANACONDA, MONT.—George H. Dorn, manager of the Mines Operating Co., Park City, Utah, has information as to a 500,000 ton custom plant at the Titanic mine to treat low grade ore; estimated cost is $300,000.

BUTTE, MONT.—It is reported the Northern Pacific railroad will electrify its lines within the next 12 months through the Rocky Mountain district. It is stated also that power will be used on the Gilmore & Pittsburgh line. Power sites have been secured.

CASCADE, MONT.—Cascade Equity Co-Operative Association will erect a grain elevator. E. J. Brown is president.

DILLON, MONT.—This city will install a lighting system under the direction of Wm. E. Chapman, city engineer.

HARDIN, MONT.—About $50,000 will be spent for the erection of bridges in Hardin and Wyola, and a number of smaller bridges.

RUBY, MONT.—Machine shop and all the machinery of the Conway Dredging Co. were badly damaged in a recent fire, loss $125,000. James Kammerer, Butte, Mont., manager of the company, states the shops will be reconstructed.

WHITEHALL, MONT.—A $30,000 municipal water works is to be constructed at Whitehall. George E. Baker is city engineer.

CRAIG, COLO.—Burns & McDonnell, 821 Scarritt building, Kansas City, Mo., engineers, are making plans for a waterworks plant to cost $40,000.

BLACKFOOT, IDA.—The council has decided to investigate a number of power sites with a view to installing a municipal plant.

BOISE, IDA.—Public Utilities commission in its report to Governor Alexander in the matter of a north and south railroad for the state, found that three lines could be constructed, one 100 miles long, another 100 miles and the third 172 miles, each to cost at the rate of $75,000 a mile.

CHALLIS, IDA.—County recently voted $35,000 for the construction of 5 new bridges over the Salmon river. The state highway commission is to join in building one of the bridges, having appropriated $6,000.

COEUR D'ALENE, IDA.—This city will ask permission to construct and operate an electric light and water works system.

GREER, IDA.—Saw mill is to be erected by George R. Schofield with a daily capacity of 100,000 feet.

ARLINGTON, WASH.—Brown & Kunze Co. is preparing to construct a sawmill of double block type, having a capacity of 100,000 feet per 10 hours, to take the place of the recently burned plant.

BELLINGHAM, WASH. — Bellingham Shingle Co.'s plant, recently badly damaged by fire, will be rebuilt to have a capacity of 40,000 shingles a day.

BREMERTON, WASH.—Bremerton Machine Works has been incorporated; $6,000 capital stock; by A. Stebick, W. O. Bullette and others.

CASTLE ROCK, WASH. — Castle Rock Briguet Co. has been incorporated; $150,000 capital stock; by D. J. Hille, C. C. Ruckles et al.

DAVENPORT, WASH.—Guy H. Harvey, county engineer, announces about $50,000 has been appropriated for bridge work in this county this year.

EVERETT, WASH.—Hartford Eastern Railway Co. has been incorporated; $10,000 capital stock; by S. J. Pritchard, W. J. and B. J. Rucker.

HOQUIAM, WASH.—It is reported Robert Lytle and associates will erect an electrically-driven saw mill in Hoquiam.

HOQUIAM, WASH.—Bids will be asked soon for a steel bridge over the Little Hoquiam river. C. E. Fowler, civil engineer, Seattle, is preparing plans.

HOQUIAM, WASH.—Woodlawn Mill & Boom Co. will construct an electrically-driven shingle mill with a capacity of 400,000 to 500,000 shingles every 10 hours. R. F. Lyle, H. W. Bale and William Leck are interested parties.

LANGLEY, WASH.—H. E. Wood, electrical engineer, Prince Rupert, B. C., is investigating the question of an electric lighting system for Langley.

PE ELL, WASH. — Washington Pipe & Foundry Co. has petitioned for a franchise to erect and operate a water works system costing $25,000.

PULLMAN, WASH.—H. L. Burnett and others, representing the United States Service Co. have applied for a franchise for the erection and operation of a gas plant in Pullman.

SEATTLE.—Bids will be received until July 23 by the board of public works on two draw bridges to cost $420,000 and $460,000.

SEATTLE.—Franklin Tool Works has increased its capital stock and will make extensions and improvements.

SEATTLE.—W. R. Grace & Co. will request Pacific Coast Ship Building yards to bid on construction of steamship of the Colusa type, costing about $800,000.

SEATTLE.—The county commissioners will receive bids until 11 a. m., July 20 for a $28,000, steel bridge over the Duwamish river. Lump sum bids required together with certified check for 5 per cent of bid. Arthur P. Denton is county engineer.

SEATTLE.—Port of Seattle commission's

engineer estimates $33,000 as the cost of construction and materials for a belt line connecting the trackage of the different piers for which a franchise is held.

SEATTLE.—Harbor Island Dock & Terminal Co., White building, plans the construction of a large dock, to cost about $500,000, on Harbor Island. O. D. Fisher, Lilly & Co. and others are interested in the matter.

SEATTLE.—An American consul in Canada reports that an elevator company in his district will erect a reinforced concrete grain-mixing elevator to cost about $100,000. Further information on the above of W. B. Henderson, 922 Alaska building.

SPOKANE, WASH. — James H. Strack, county engineer, recommends the construction of a steel or concrete bridge at Nine Mile.

SPOKANE, WASH.—Commissioner of public works will ask for $60,000 bonds to construct a bridge across the river on Howard street and make other improvements.

SPOKANE, WASH.—Mountain Trailer Co. is to construct a plant to manufacture a vehicle to be drawn behind an automobile. Incorporators are J. T. Mountain, Arthur Herta and M. D. Hawkins, all engaged in vehicle manufacturing and selling.

TACOMA, WASH.—Feix & Co., Vancouver, B. C., is to establish a factory at Tacoma to manufacture sawdust and shavings collecting system.

TACOMA, WASH.—United States Hydraulic Ram & Irrigation Co. has been incorporated to manufacture hydraulic rams; $100,000 capital stock; by Harry H. Johnston, J. G. Lampson and J. E. Lester.

COQUILLE, ORE. — Robert R. Watson, county clerk, will receive bids until July 8, for constructing a Howe truss bridge across the east fork of the Coquille river; check for 10 per cent required.

EUGENE, ORE.—The city is considering the installation of a 1,250-kilowatt, steam-electric power plant as an auxiliary to the existing municipal plant.

FLORENCE, ORE.—Bonds of $10,000 have been voted for the construction of a water works system.

HOOD RIVER, ORE.—State engineer's office at Salem, has given permission to August Guighard, of Hood River, to use water from Hood river for $300,000 hydro-electric plant.

KLAMATH FALLS, ORE. — The government will construct a saw mill one mile south of Kirk, to be operated by the Klamath Indians; J. M. Bedford, forest supervisor of the reservation.

LEBANON, ORE.—Announcement is made that a $20,000 steel bridge is to be built soon over the Santiano river with a span of 334 feet.

MEDFORD, ORE.—Light committee of the council reports favorably on the application of the Rogue River Public Service Corporation for a light franchise.

PORTLAND, ORE.—Studebaker Corporation of America, E. R. Benson, Detroit, vice president, is planning to erect a $75,000 distributing station at Portland.

PORTLAND, ORE. — The city engineer is preparing plans for the Union avenue viaduct over the tracks of the Oregon & Washington Railroad & Navigation Co., to cost $50,000.

PORTLAND, ORE.—August Rosen, owner of the planing mill recently burned with about $20,000 loss, is seeking a new location for his mill.

PORTLAND, ORE. — Oregon-Washington Railway & Navigation Co. will erect a 30-mile extension to its line recently completed from Vale to Riverside.

PORTLAND, ORE.—DuFur Ventilator Co. has been incorporated to make ventilators; $5,000 capital stock; by W. H. H. DuFur, C. A. Barr and L. J. Kuntz.

PORTLAND, ORE.—Coast Culvert & Flume Co., Kenton Station, will double at once the capacity of its plant, adding to its output of smooth pipes, tanks and metal troughs. John S. Beal is manager.

PORTLAND, ORE.—It is announced that Robert E. Strahorn, president of the Portland, Eugene & Eastern railroad, a subsidiary of the Southern Pacific, plans electrifying the line from Whiteson to Corvallis, 43 miles. Full details have not been worked out.

RIVERSIDE, ORE.—It is reported at Portland that the Oregon-Eastern, a subsidiary of the O. W. R. & N. railroad will extend its line 30 miles west, from Riverside to Crane Creek Gap, at an estimated cost of $750,000. J. R. Holman is chief engineer of the road.

SALEM, ORE.—Appropriation is to be made in the next county budget for a steel bridge between Salem and Polk county.

SPRINGFIELD, ORE.—Confirmation of the title of the Oregon & California railroad in grant land probably means the completion of the Natron cut-off and the construction of railroad shops in Springfield.

THE DALLES, ORE.—Plans for buildings in connection with the terminals at Pilot Rock and in The Dalles are being prepared by the O. W. R. & N. railroad.

BANNING, CAL.—H. S. Roach will rebuild the sawmill burned last summer; special equipment will be installed.

BURBANK, CAL.—Bonds for $25,000 have been voted for a municipal electric plant.

KENNETT, CAL.—Shasta county supervisors, Redding, Cal., are considering building a $20,000 bridge over Sacramento river at Kennett.

LOS ANGELES.—H. Hamlin, city engineer, is preparing plans for the Fourth street viaduct.

LOS ANGELES.—Jordan Oil Co. is to rebuild its burned plant at Twenty-eighth street and the Santa Fe tracks at a cost of $50,000.

LOS ANGELES. — The board of public utilities is preparing plans for four viaducts over railway tracks at a cost of $3,500,000. The state, county and railway companies will bear the expense.

OAKLAND, CAL. — Southern Pacific railroad, W. Hood, chief engineer, San Francisco, has plans to build a suburban station in Oakland, covering a square block, at a cost of $1,250,000.

ORLAND, CAL.—Eborn Brothers are building a factory to manufacture automobile wheel rests.

PINOLE, CAL.—S. & L. Electric Co. has been organized by Harry Statz of Pinole and T. H. Nelms, San Francisco, to manufacture electric burners.

SAN FRANCISCO.—Ernst & Panario have plans for a $110,000 steel and brick garage at Eleventh and Market streets.

SAN FRANCISCO.—American Forge Co. is to build a shop at Ecker and Lementina streets.

SAN FRANCISCO. — Pacific Machinery & Tool Steel Co. has been incorporated to manufacture machinery and steel; $25,000 capital stock by T. D. Logan, H. Bermay and L. Ferrari, 948 Market street.

SAN JOSE, CAL.—The burned plant of the Bean Spray Pump Co. is to be rebuilt shortly at an expense of $50,000.

SESPE, CAL.—Chas. W. Petit, Venhura, county surveyor, is preparing plans for a $18,000 steel bridge, 245 feet long, over the Santa Clare river.

STOCKTON, CAL. — Inland Transportation Co., Capt. Benjamin Waters, manager, has bought Wood Island as a site for a $50,000 ship yard.

VISALIA, CAL.—Mt. Whitney Power & Electric Co. plans a hydro-electric plant in the Sequoia national forest, costing $750,000. H. A. Klengel, Visalia, is chief engineer.

NEW CATALOGS

RESISTANCE STARTING SWITCHES.—A bulletin describing its line of resistance starting switches for alternating current induction motors has been issued by the Allen-Bradley Co., Milwaukee. The different types of switches are illustrated and described in detail.

PULLEYS.—The Oneida Steel Pulley Co., Oneida, N. Y., has issued an eight-page folder describing its split steel pulleys. Half-tone illustrations and line drawings showing the detailed construction of these pulleys are presented, together with comprehensive descriptive matter. A standard abridged price list also is included.

SLOTTING MACHINES.—An interesting 24-page catalog covering various types of slotting machines has been issued by the Newton Machine Tool Works, Philadelphia. The complete Newton line of standard and special slotters is covered, illustrations of the various tools being given, together with specifications and descriptive data.

CHIMNEYS. — A comprehensive catalog, covering reinforced concrete chimneys for power plants and large industrial establishments, has been issued by the Weber Chimney Co., Chicago. In addition to general information of interest covering chimneys, numerous illustrations of typical Weber chimneys are presented, together with a list of users throughout the world.

TUBULAR BOILERS.—The S. Freeman & Sons Mfg. Co., Racine, Wis., has issued a handsomely illustrated bulletin describing its line of horizontal return tubular boilers. The construction of these boilers is illustrated and explained in detail. The Freeman company also manufactures Scotch marine, internally fired and water tube boilers, water jackets, steel tanks, brick hardening and vulcanizing cylinders, self supporting steel stacks, stand pipes, riveted steel pipe, etc. A number of these products are described in this bulletin.

PATTERN SUPPLIES. — The Wellman Pattern-Supply Co., Cleveland, has issued a comprehensive 44-page catalog covering a complete line of pattern shop supplies including white metal and brass pattern letters and figures, pattern letter cases, fillets, brass and wooden dowel pins and core box pins, rapping plates, fillet tools, pattern lumber, clamps, vises, pinch dogs, etc. A number of special pattern shop tools including jointing machines, band saw grinders, etc., also are illustrated and described.

MONEL METAL.—The International Nickel Co., New York City, in a 16-page booklet recently issued, briefly discusses the properties of Monel metal which is a natural alloy consisting approximately of 67 per cent nickel, 28 per cent copper and 5 per cent other metals. The mines from which the ore is obtained are located in the Province of Ontario, Canada, and are operated by the Canadian Copper Co., a subsidiary of the International Nickel Co. The refined metal can be manufactured in the form of rods, castings, forgings, tubes, wire, strip stock, sheets, etc. In color, this metal closely resembles nickel, while its tensile properties are similar to that of steel. This metal also is highly resistant to corrosion and to the eroding and cutting action of superheated steam.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to July 1.)

Bessemer, valley	$13.75
Bessemer, Pittsburgh	14.70
Basic, Pittsburgh	13.70
Basic, eastern Pa.	13.75 to 14.00
Malleable, Pittsburgh	13.45 to 13.95
Malleable foundry, Chicago	13.00
Malleable foundry, Philadelphia	15.00 to 15.25
Malleable foundry, Buffalo	12.50 to 13.00
No. 1X foundry, Philadelphia	14.50 to 14.75
No. 2 foundry, Pittsburgh	13.45 to 13.95
No. 2 foundry, valley	12.50 to 13.00
No. 2 foundry, Cleveland	13.00
No. 2 foundry, Ironton	12.50 to 12.75
No. 2 foundry, Chicago	13.00
No. 2X foundry, Philadelphia	14.25 to 14.50
No. 2X fdy., N. J. tidewater	14.25 to 14.50
No. 2X foundry, Buffalo	12.50 to 13.00
No. 2 plain, Philadelphia	14.00 to 14.25
No. 2 plain, N. J. tidewater	14.00 to 14.25
No. 2 plain, Buffalo	12.25 to 12.50
No. 2 southern, Birmingham	9.50 to 10.00
No. 1 southern, Cincinnati	12.40 to 12.90
No. 2 southern, Chicago	13.50 to 14.00
No. 2 southern, Phila. delivery	14.00 to 14.25
No. 2 southern, Cleveland	13.50 to 14.00
No. 2 south'n, New York docks	13.75 to 14.00
No. 2 southern Boston, docks	13.75 to 14.00
No. 2 south. interior, New Eng.	14.50 to 15.50
No. 2 southern, St. Louis	12.90 to 13.40
Virginia No. 2X furnace	12.50 to 13.00
Virginia 2X, Philadelphia	15.25
Virginia 2X, Jersey City	15.50
Virgina 2X, Boston points	15.75
Gray forge, eastern Pa.	13.25 to 13.50
Gray forge, Pittsburgh	13.20
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Jackson, O.	14.75 to 15.25
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phila.	20.00 to 21.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.25 to 16.25
Charcoal, Buffalo	15.75 to 17.00
Charcoal, Birmingham	21.00

IRON ORE

Lake Superior Ores.

(Lower lake ports.)

Old range Bessemer, 55 per cent.	$3.75
Mesabi Bessemer, 55 per cent.	3.45
Old range, non-Bess., 51½ per cent.	3.00
Mesabi non-Bessemer, 51½ per cent.	2.80

FOREIGN ORES

(Per unit Philadelphia.)

(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	8 to 8½c
For'n non-Bes., 50 to 65 per cent.	8 to 8½c

COKE

(At the ovens)

Connellsville furnace	$1.70 to 1.75
Connellsville fur. contr.	1.65 to 1.75
Connellsville furnace coke, fourth quarter	1.75
Connellsville foundry	2.00 to 2.40
Connellsville fdy. contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.25 to 2.50
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.00
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro mang., furnace (prompt)	$100 to 115
Ferro mang. Balti. (future)	100.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent.	18.00 to 18.50
Ferro-sil., 11 to 12 per cent.	17.00 to 17.50
Ferro-sil., 10 to 11 per cent.	16.00 to 16.50
Ferro-sil., 9 to 10 per cent.	15.00 to 15.50

(Ferro-silicon quoted at furnace Ashland, Jackson and New Straitsville.)

Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$22.06 to 22.56
Forging billets, Phila.	24.56 to 25.06
Forging billets, Pbgh.	27.00

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.45
From Pittsburgh	.619
From Youngstown	.639
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Wire rods, Pittsburgh	$25.00 to 26.00
Bess. Bill., Youngstown	$20.00 to 20.50
Open hearth billets, Youngstown	20.50
Bessemer billets, Pittsburgh	20.50 to 21.00
Open hearth billets, Pittsburgh.	21.00 to 21.50
Bess. sheet bars, Youngstown	20.50 to 21.50
Op. h'th sheet bars, Youngstown	21.50
Bess. sheet bars, Pittsburgh	21.50
Op. h'th sh. bars, Pbgh.	21.50 to 22.50
Muck bar, Pittsburgh	27.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs. Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbg. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c
Angle bars, st. sections, Chicago	1.50c
Spikes, railroad, Pbgh.	1.40c
Spikes, railroad, Chgo.	1.50c
Track bolts, Pbgh.	1.95c to 2.00c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	3.00
New England	3.00
Philadelphia	2.79
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail).	2.58
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago, to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.25c
Structural shapes, Chicago	1.44c
Structural shapes, Philadelphia	1.369c to 1.419c
Structural shapes, New York	1.359c to 1.409c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.34c to 1.44c
Tank plates, Pittsburgh	1.20c to 1.25c
Tank plates, Philadelphia	1.359c to 1.409c
Tank plates, New York	1.369c to 1.419c
Bars, soft steel, Pittsburgh	1.25c
Bars, soft steel, Chicago	1.44c
Bars, soft steel, Philadelphia	1.309c to 1.409c
Bars, soft steel, New York	1.319c to 1.419c
Hoops, carloads, Pittsburgh	1.25c to 1.30c
Bands, Pittsburgh	1.25c
Shafting, Pbgh., contr.	66 to 68 per cent off
Screw stks., Pgh. carl'ds,	68 to 70 per cent off
Bar iron, Chicago	1.20c
Bar iron, Philadelphia	1.175c to 1.225c
Bar iron, New York	1.15c to 1.20c
Bar iron, Cleveland	1.20c to 1.25c
Bar iron, Pittsburgh	1.25c to 1.30c
Hard steel bars, Chicago	1.20c to 1.25c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.80c
No. 28, black, Chicago	1.89c to 1.94c
No. 28, tin mill, black, Pbgh.	1.85c to 1.90c
No. 28, galvanized, Pbgh. (nom.)	4.50c to 5.50c
No. 28, galvanized, Chgo., nom.	
No. 10, blue, anld., Pbgh. nom.	1.35c
No. 10, blue, annealed, Phila.	1.509c to 1.559c
Tin plate, 100 lb., coke base.	3.10c to 3.20c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pick'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squarring	10 cents
Roller leveling	10 cents
Patent leveling and re-squarring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black.	Galv.
	Butt-weld.	
Steel, ¾ to 3 inches	79	57½
Iron, ¾ to 2½ inches	71	46
	Lap-weld.	
Steel, 2½ to 6 inches	78	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	73
Iron, 3½ to 4½ inches l. c. l.	61

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nail jobbers, Pittsburgh	$1.60
Plain wire, jobbers, Pittsburgh	1.40
Galvanized wire, jobbers, Pbgh.	2.20
Polished staples, Pbgh.	1.70
Galvanized staples, Pbgh.	2.50
Barb wire, painted, jobbers, Pbgh.	1.70
Barb wire, galv., jobbers, Pbgh.	2.50